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IN THIS ISSUE:

Individual Creativity in Research

VIGNETTE

CERAMIST

ADRIAN G. ALLISON

It has been said that research people live on the brink of failure. Years of research experience have convinced Adrian G. Allison, Battelle ceramist, that this statement is true. Yet, he points out, seldom does the research scientist actually fail; his skill, pertinacity, and many-sided attack on problems usually lead to their successful solution. At the same time, Al notes, technology is becoming increasingly complex and more creativity and ingenuity, as well as more technical knowledge, are required from the technologist if he is to continue his record of accomplishment.

His guidance of studies of ceramic materials for high-temperature uses in nuclear reactors and in aircraft and missiles has made Al strongly aware of the increasing complexity of research. Such studies are a natural growth from his long-time interest in refractory materials. At Battelle, he has been associated with the development of all types of refractories ranging from basic to acid types. He has aided in the development of welding-rod coatings, welding backup materials, white wares, structural clay products, and even clay pigeons. In addition, studies of pure oxide ceramics, porcelain enamels, carbon and graphite materials, and some glasses have also engaged his attention.

Experience in other organizations has contributed to Al's knowledge of ceramics. He was instrumental in introducing the production of mullite refractories in one company, and for another he helped guide the development of new ceramic production techniques. While directing ceramic research at Los Alamos Scientific Laboratories, his efforts led to a method for the slip casting of pure magnesium oxide and to the successful development of ceramic coatings for graphite molds and crucibles.

For his professional training Al attended The Ohio State University where he received a bachelor's degree in ceramic engineering and an M.S. degree in the same field. His studies have served as a basis for more than a half dozen articles and have led to five patents. Al is a member of the American Ceramic Society.

Al's family includes his wife Esther and his daughter who recently received her nursing degree. For relaxation he likes to build furniture and to contrive fishing tackle and try it out. His wife joins him on fishing trips, but not to fish.

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Nontechnological Aspects of the Space Age

The partisans of space exploration rightfully are concerned about public support for their activities. If public support is not forthcoming, neither will be the financial support which almost has to channel through the government. Accepting for the moment the fundamentally humanistic nature of space explorations, it becomes then a problem of educating people to a realization that their interests are being served by space exploration, and thus gaining their participation and support.

It is impossible to predict what influence the conquest of space will have on the community of nations on earth. Perhaps we will find in space the common sentiment which will serve to unite the human species. Such a sentiment, in combination with weapons which make war unprofitable for winner and loser alike, may spell the end of the war.

There is no need to add to present confusion regarding the sufficiency of trained scientists and engineers. It is clear that a higher percentage of our working population will need broader technical training in the future. There is a need for specialists . . .; only specialists will be in a position to capitalize on new scientific discoveries pertinent to their fields. And yet, an ever broader basic training will be needed if the specialist is to comprehend the relationship of the parts to the whole, and if one specialist is to communicate effectively with another in a different field. Time is limited, and the span of knowledge is growing ever larger. It seems that the future pattern should be one of granting mastery of basic concepts through formal education, followed by specialization on the job . . .

. . . . something needs to be said about the coordination and management of the activities bent in finding the answers. The cost, in both time and money, is too great to permit anything to slow progress in this field, or to permit wastefulness where it might be avoided. Steps have already been taken to provide central civilian governmental control and to coordinate the military and civilian aspects of space exploration. It is essential that these first measures be augmented and supported, and that they be allowed to function effectively.

. . . . law, philosophy, history, politics, and many other arts and sciences . . . will enter the picture somewhere. One thing is certain about the conquest of space: it will require the best efforts of every branch of science, engineering, and education that we can master; it challenges man on virtually all fronts of his physical and spiritual existence.

Robert B. Filbert, Jr., chief of Battelle's division of chemical engineering, before the Golden Jubilee Meeting of the American Institute of Chemical Engineers at Philadelphia, 1958.

Individual Creativity in Research

The ability to think creatively is a quality possessed by many unusual individuals. The author stoutly maintains, however, that most persons can increase their creativity quotient. Suggestions for improving individual creative qualities are presented.

by LEWIS E. WALKUP

MODERN SCIENTIFIC RESEARCH involves a paradox: Every college junior knows that the "scientific method" comprises a number of steps so logical and systematic that, it seems, anyone could follow them, outline in hand. But the actual output of modern research is so unorthodox and bizarre that one has difficulty in imagining it resulting from anything systematic. Have we finally found the conventional way to arrive at the unconventional? the ordinary way to reach the extraordinary? Or, is there more to scientific research than is contained in the simple statement of the "scientific method"?

If scientific research actually invokes powers greater than ordinary—and its products seem to prove that it does—then we certainly should try to discover those creative elements in it that have led to the recent explosive growth in man's understanding of nature and of his physical self.* It is vital to discover the secret of this amazing success for two reasons: First, we stand to benefit by using this method more intensively and by applying it in other areas—perhaps most of all we need a better method to understand ourselves. Second, and more sinisterly, we could lose our magical powers in research should we neglect to understand them. It would not be the first time that man has lost a poorly understood technique which once led him to considerable heights of culture and power.

In seeking to distinguish creative scientific research from the formal scientific method we would be looking for the same sort of difference as that between: creative art and the study of esthetics, creative writing and grammar, composing and harmony, religion and theology, or, for that matter, between business management and formal economics. In all such cases, we sense a vast difference between principles and practices. We suspect that analysis is no more able to define the subtle elements that go into the skilled performance of the expert than it can define neatly the difference between a living and a dead thing; and we sense that the sort of chemical analysis which proves that the diamond is nothing but pure carbon has somewhere got off the track in its search for the essence of beauty in gems.

CREATIVITY AND THE SCIENTIFIC METHOD

Where might the creative act slip into the operation of the formal "scientific method"? Before this question is considered, we might review the elements of this method. While there is no formally accepted statement of it, the following summary includes its chief elements.

1. A "problem" is defined for which one is to seek a "solution".
2. An hypothesis is advanced stating a possible solution.
3. Predictions are made from this hypothesis relative to the facts of nature in the area of the problem.
4. Pertinent data are gathered in the area of these predictions.

*This need to understand the techniques of creativity has led to a number of books on the subject and to many articles in the literature. The present article owes much to *The Art of Scientific Investigation* by W. I. B. Beveridge. Also of interest is *Creative Factors in Scientific Research* by Austin L. Porterfield, and *The Psychology of Invention in the Mathematical Field* by Jacques Hadamard, to mention only a few. Fortunately, these and other books mentioned herein contain excellent bibliographies which can lead to many articles and books on the subject.

5. The data are used to "test" or "prove" the predictions and, thereby, to test the hypothesis.
6. Conclusions are drawn as to the validity of the hypothesis and as to its usefulness in solving the problem and in extending our knowledge of nature.

Ordinarily emphasis is placed on the rigor and logic of this method. However, without detracting from the importance of logic, we will look at ways in which a soul can be breathed into this dead body, ways that creative genius might slip into this formal scheme and work through it, or one might almost say, work in spite of it.

The first loophole occurs in the very first step of the method—the statement of the problem. In man's early history he made many misleading statements of his vital problems—as he probably is doing yet. When faced with a plague, he thought that his problem was to find which of the gods was angry at him, and why. In so stating the problem man denied himself any possibility of finding the obvious solutions to disease. In many cases, the creative statement of the problem is practically all that need be done to produce a solution.

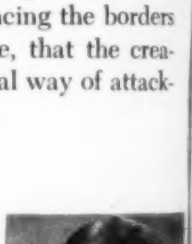
Of course, the most obvious place for creativity to slip into the formal scientific method is in the formulation of the hypothesis and the making of predictions from it. This step is so important that it might be called the tail that should wag the whole dog. Many times it is relatively easy to carry out the remainder of the process once an inspired hypothesis has been created. But there still remains one other point at which creativity can enter the formal workings of the scientific method—the drawing of conclusions from the results. Many persons have read the story of the Prodigal Son's return to his father's house, and have drawn the obvious conclusion. But it takes the creative attack to recognize a secondary moral in the story: the inadvisability of being a fat calf. Many times, the drawing of such unobvious conclusions can be of far greater importance than the unimaginative comparison of the results with the original assumptions.

One of the creative mind's greatest contributions to the success of the scientific method is that of carrying out the whole process in the imagination, without time-consuming experiments, tedious data taking, or the awkward formal drawing of conclusions. The creative intellect can and does perform many experiments in the "twinkling of an eye". Without this ability, many scientific searches would have so exceeded the patience and energy of man that they never would have been completed at all. In a sense, the sum total of these extra-logical activities constitutes what has been called "creativity", the most elusive of all man's varied abilities.

Nature of the Creative Person

Many attempts have been made to isolate creativity, with little success. It is an almost mystical ability possessed in large measure by gifted people but which most of us exercised as children; exercise now, to a limited extent; and could exercise more effectively if only we appreciated its elements and would practice its development. William N. Sheldon in *Psychology and the Promethean Will* and A. H. Maslow in *Motivation and Personality* have pointed out that most children are highly creative but that, tragically, their creativity vanishes sometime between adolescence and maturity in something Sheldon calls "dying back of the brain". This tragedy happens to so great a percentage of mankind that it is scarcely noticed. In fact, the few who escape it are considered a little queer. Fortunately, the few who escape this wilting of mental powers seem to continue to improve their creative abilities up to the onset of senility.

This conclusion does not conflict with statistical data to the effect that many great scientists contributed most to the advancement of their field during their early maturity. Such contributions involve not only a personal creative approach, but also the latest mathematical and conceptual tools and working in those areas of science which are ripest for major breakthroughs. Other work can be equally creative as far as personal performance is concerned, and yet not lead to results that would be classed as advancing the borders of knowledge. This implies, of course, that the creativity being discussed here is a personal way of attack-



As holder of more than three-score foreign and domestic patents and with 15 years' experience in guiding the research activities of others, Lewis Walkup has some pertinent ideas to contribute in the subject of creativity. The patents are largely the fruit of his participation in physics investigations at Battelle over the past 12 years. His interests have been primarily associated with studies relating to ultrasonics, electrostatics, and the graphic arts. The latter studies have included research in gravure, letterpress, and lithographic printing plates, photographic papers, and particularly in xerographic methods of reproduction, to which Walkup has made major contributions. Early, while with the Western Cartridge Company, the author was responsible for numerous innovations, notably those which led to better ammunition for match competition and improved methods for drying and testing explosives.

ing problems, and that it can be applied to small and even unimportant problems as well as to large and important ones. This observation poses the interesting question as to whether or not the performance of these unusual individuals could be duplicated in others by special education.

One point that seems to have been overlooked in considerations of creativity—possibly because of the systematic attack on intellectuality by certain political and social groups—is that creativity in general, and scientific creativity in particular, involve intellectual activity practically exclusively. It probably follows that only those persons who are strongly inclined toward intellectual exercises can or should try to achieve much in this realm. No absolute superiority need be claimed for intellectually oriented persons; they are frequently just as one-sided as are the muscle-exercising, physical-activity-oriented athletes, or the emotionally oriented esthetes. But, for this specific type of human endeavor, one must exercise his intellectual faculties so strenuously that there is little chance of success unless he is impelled toward the incessant exercising of these faculties.

"The mere formulation of a problem is far more often essential than its solution, which may be merely a matter of mathematical or experimental skill. To raise new questions, new possibilities, to regard old problems from a new angle requires creative imagination and marks real advances in science."

Albert Einstein

The erroneous idea has grown up that creative persons are almost viciously nonconformist. Possibly this follows from the fact that creative ideas themselves disrupt the comfortable complacency of the status quo. It is not so much the person as the ideas that disturb our illusions on a subject.

In any case the question might be raised as to who is disturbing whom. Since the goal of most scientific groups is progress, one might say that although the creative members may be in the minority, those who are uncreative are still the obstructionists.

A similar misconception about creative people is that they must be left to go their own way, that they resist being directed into particular fields of activity. It is true, of course, that some persons tend to wander off the prescribed path, whether in research or in other activities. But one observes this wandering just as much, or more, in ungifted and uncreative researchers as in gifted ones. In the gifted person the illusion of wandering may result from the fact that his method of attack on a problem, and the results he achieves, may be so unusual as to make it appear that he has forsaken the original problem. Actually, really creative intellects have such a broad spectrum of cosmopolitan interest and so many different tools to use on a given problem that the relevance of their work may not be immediately apparent. Leonardo da Vinci is perhaps the classical example of this virtuosity.

Frequently, creative persons give the illusion of specialization by the intensity of their interest. Creative individuals can find so many facets to a single problem that they can entertain themselves with it, and are challenged by it, for long periods. In other cases, we may be misled by the pretenses of creativity shown by relatively limited specialists who, of necessity, narrow down a field so that their limited abilities can give the appearance of mastery and achievement. Really gifted creative individuals can be and are attracted by almost any problem in almost any field; and, with little effort, they can feel enthusiasm for trying to understand almost any mysterious phenomenon. In this the creative person differs from the specialized expert who, while he may sometimes appear to create, is primarily motivated to be "expert" or an "authority" in a specific field. The "authority" will be eager to talk about what he knows about a field; the creative person will not care to dwell on what he knows, he will be far more interested in thinking and talking about what he does not know.

Some attempts have been made to study individuals who seem to have creative ability, partly because it is so difficult to study the act of creative thinking itself. Unfortunately, many of these studies have demonstrated little of the creativity that they profess to be exploring. Rather they have been limited to attempts at empirical correlations between a wide assortment of properties and creative ability. Studies indicate that creative ability does not correlate particularly well with intelligence quotient. While creative individuals appear to have IQ's above 110 or so, many persons having very high IQ's show little or no creative ability. On the other hand, creative persons seem to have strong imaginations and powers to visualize situations. They are often open minded to the point of gullibility in accepting bizarre ideas; at least they will toy around with such thoughts seriously before discarding them as useless or invalid.

Creative persons, too, seem to have a high ability and willingness to explore tenuous connections between only remotely connectable things. While the vast majority of such attempted connections lead to nothing useful, ocasionally one yields a novel and useful insight into the problem at hand. Creative persons

frequently lack interest in polite society, perhaps because exercising their intellectual faculties, unfortunately, is seldom possible at social gatherings. All in all, observations of this sort add little to our understanding of creativity.

Nature of the Creative Act

What is the creative act? It is safe to say that no strict definition is possible. Most of us understand quite well what we mean by creation or invention. In the following, we shall be concerned with the processes whereby "creative" individuals arrive at concepts and understandings of obvious value or significance out of materials that in the hands of the average individual would have yielded nothing much of value. Thus Einstein, out of a set of data available to almost any scientist of his day came up with a startlingly new concept; and da Vinci suggested flying machines that were almost practical, long before other advances in science made it obvious that certain combinations of matter would lead to a machine that would lift itself into the air. He demonstrates a singular fact about creative persons—their ideas frequently are more real to them than are the so-called hard facts of nature—when he said, "There shall be wings! If the accomplishment be not for me, 'tis for some other".

"With accurate experiment and observation to work upon, imagination becomes the architect of physical theory."

John Tyndall

The creative act composes a series of stages. According to most writers on the subject, the stages occur in approximately this sequence: First, attention is drawn to some mysterious phenomenon or missing correlation; in other words, a problem is formulated. The researcher then reviews the parts of his knowledge which bear directly or remotely on this problem. If the problem is serious enough, he may seek additional facts about it from the literature or through consultation with his colleagues. If it is legitimately a problem, and not just some known fact of nature that he is not acquainted with, the researcher will still be faced with it after this data-gathering process.

This is a good point at which to recognize the importance of basic knowledge to our would-be creator. It is all-important that he have available the best and most pertinent facts in the immediate and related fields if he is to create anything of value. While creative persons seem to discover or create most unusual relationships and combinations of facts, they do not necessarily uncover new facts about nature. Darwin uncovered many new facts in biology. However, these were incidental to his real contribution which lay in the relationships he discovered in the knowledge he and others had accumulated. Galileo also was more interested in relationships than in data. More recently, Chester F. Carlson, in creating the photographic process of xerography made an interesting and valuable association between the physical phenomena of photoconductivity, electrostatic attraction, and the light image present in a camera. But, he added few if any new facts in any of these sets of phenomena. So it is with creative people, they make exciting combinations of facts and ideas, but they can create only with the basic data available to them. Hence, nothing herein implies that creativity can be substituted for knowledge in a field. However, knowledge in a field certainly does not substitute for creativity either, although it can be and is used many times to cover up a lack of creativity.

After this stage, in which one becomes saturated with pertinent knowledge, comes a period of playing around with the problem and with the various jigsaw pieces of data and relationships that might fit to give a final answer. During this most exciting period, many false combinations spring into consciousness, with the appearance of being the sought-for solution. Most of these combinations drop stillborn because of some obvious defect. A few survive briefly only to die after a short calculation or other consideration shows a serious fallacy in their makeup. To survive, ideas must be plausible and useful; novelty is not enough, neither are expressions of wishful thinking. However, all of these false starts serve a valuable purpose: they show where the solution does not lie. Hence, they narrow the fields that are important to the roaming imagination of the thinker.

Usually, but certainly not always, there follows a period of relative frustration. All of the obvious solutions have been explored and found faulty. The way seems barred. Then follows what some writers have called a period of "induction" during which it is assumed—for want of a better explanation—that the subconscious mind is working on the problem, perhaps during sleep or while one is consciously thinking of totally unrelated things. Out of this activity there comes the near-mystical flash of thought that gives the solution, or, at least, points to a line of reasoning that leads quite directly to the solution of the problem. There is no way to explain this flash—it defies description—but you do, or will, recognize it when you have it. This product of the subconscious is so well

documented that almost any treatment of creativity abounds with specific illustrations of it.

After this, the rest of the scientific method can be carried out by less gifted persons, to verify the relations glimpsed in the flash. The vital and creative stage of the problem is finished, at least until its solution leads to another problem as knowledge progresses.

One thing seems obvious from the above description: This type of creativity is highly personalized. It happens to individuals during periods of intense concentration on single problems. It does not usually occur to persons in groups and it practically never is done by groups. One rarely hears of a group—a committee—creating an invention, a symphony, a poem, or even a musical comedy.

Suggestions for Inducing Creativity

How can one set the stage for creativity in himself? Because of the lack of understanding in this field, no one seems to have attempted to outline a procedure for promoting creativity. However, since there appears to be no harmful or misleading results that could follow from such a venture, some suggestions are offered here. No claim is made that this is the only, or even the best, method.

"It is more important to have a clear understanding of general principles, without thinking of them as fixed laws, than to load the mind with a mass of detailed technical information which can be found in reference books or card indexes. For creative thinking it is more important to see the wood than the trees . . ."

William I. B. Beveridge

In the first place, as stated above, scientific creativity is intellectual. Hence, anyone attempting it should be able and willing to use his intellect to its full capacity. It helps if you actually enjoy intellectual activity more than anything else in life. The recognition of this fact will clear up a lot of misunderstanding. Next it is important to build in your mind the idea that this particular series of intellectual acts is the most important thing that you could be doing about your particular problem. To do this you must minimize and put out of your mind all of the aspects of your problem that have to do with scheduling, interpersonal relationships, economics, and even pleasing your superiors. If you are successful at this self-conversion, you will end up believing that the intellectual analysis you are about to make is your most potent tool in solving your problem. Then you have no feelings of guilt because you are sitting at your desk rather than operating equipment at the bench or attending conferences on the problem.

With this confidence in the importance of what you are doing, the next task will be less difficult: Put yourself in so leisurely a mood that you will entertain almost any thought about your problem. Admittedly, this is difficult in the usual environment of ringing telephones and insistent administrative and routine requirements. But, difficult or not, it is necessary and vital. Remember that a really accurate and creative technical analysis is the most important thing that can be done for your problem, and then achieve the required feeling of leisure at whatever cost. At least one person has found that the feeling of disinterest in usual activities that accompanies a headache is sufficiently helpful in this respect to bring with it quite a bit of creativity—several great creative discoveries actually were made during serious illnesses. But this sort of leisurely frame of mind is essential; creative thinking of the sort being sought is not done on the fly or mixed in with the rush of usual activity.

The next step is relatively simple: Provide yourself with a lot of clean paper and pencils, along with slide rule and, perhaps, a few handbooks or texts, depending on the field of your problem. Then THINK, AND THINK, AND THINK. "Free association" the phychologists might call it. Write down almost everything that occurs to you that has any bearing on your problem; so that you know that your ideas are recorded and will not be lost. Hence, you are not required to develop each idea as it occurs to you, but can move on to explore other interesting fields. Some of the most valuable products of this period of "meditation" may be just those fleeting thoughts that would be lost if you were trying to follow only one line of thinking to a definite conclusion. Perhaps what you want to do might be described as "playing with" the problem. In doing this you will want to think about it from every conceivable angle and as it depends on all sorts of remotely related effects. If the problem involves microscopic elements, you may want, as it were, to reduce yourself to microscopic size and try to "feel" the effects that you are trying to understand or control. The discovery of the benzene ring is reported to have followed just such a dreamy visualization of possible arrangements of carbon atoms. You may want to act out whole series of experiments to imagined results, or to build whole processes or even factories in imagination to see how they will work. As Max Planck has pointed out, "Again and again the imaginary plan on which one attempts to build up order breaks down and then we must try another. Thus imaginative vision and faith in the ultimate success are indispensable. The pure rationalist has no place here".

You will find yourself writing down all sorts of things. For example, you may state the problem in a variety of ways, or decide what you would do with certain data, if you had them. You may jot down approximate calculations of orders of magnitude of effects that you have thought of—but don't let such calculations get out of hand or distract your attention. You will probably want to list all possible theories concerning the solution you are thinking of; "inventions" relating to the problem; questions to which you would like to have the answer; and a wide variety of physical effects that might be involved; to mention only a few.

One pitfall must be avoided at this point: it is quite possible that you will come across one or more items that look so good that you are tempted to stop the whole process and dash out into the laboratory to try them out. Resist this impulse. Remember, your "brilliant" idea is written down and will not be lost. If it really is as good as it appears at the moment, it still will be good tomorrow or next week.

At various points throughout this analysis or idea-creating stage you may want to refer briefly to the literature for data that you need in approximate calculations. This is fine. However, avoid making any literature searches worthy of the name at this point; they can throw you quite off the track of the analysis that you have started. This is not to deny, of course, that at other times you may want to make quite extensive literature searches. To the above you may wish to add the reading of your notes from time to time, perhaps combining them in various ways or discussing your problem with others who understand and are in sympathy with this method of attack on problems. Generally, however, you will learn not to expect too much from such conferences; you may get facts and criticism, but no one can help much with the process of analysis that you are going through. Finally, you will want to arrange your notes and the material they contain into a somewhat orderly whole. In so doing you may find, perhaps to your surprise, that you have a very systematic outline which can be followed in experimental research, and, probably, that you have come up with much more material than you thought you could produce with your own knowledge.

It is well to work at this activity only in sizable periods of concentrated effort. Perhaps one hour is as short a time as is worth while, and several hours would be better. Four or five hours may be all you can use productively in a single day. Also, you may experience the benefits of the induction process mentioned earlier. On renewing the activity a few days later, you may be more productive than you were at the end, or during any part, of the previous session.

Of course, this one analysis is not the end of such activities. It is only the beginning. Experimental results may change the situation entirely, and newly learned facts—possibly from further perusal of the literature—may so change the whole process that you must, or you will have the exciting opportunity to, start the whole process all over again. In this regard, one director of research for a large corporation has suggested that forty per cent of the effort on a research project should be dedicated to this sort of pre-experimental analysis. He suggests also that another forty per cent be dedicated to analysis of the results after the experimental phase. This leaves twenty per cent of the effort for the actual experimental work. While such figures are not applicable to all research, they certainly emphasize the importance of the attack being considered here.

One final observation about intellectual activity of the creative sort—it is one of the most trying and exacting things that a human can do. Consequently, while you may enjoy having completed such activity, you may find yourself avoiding it by all sorts of ruses. Scientific creativity has much in common with other forms of creativity, all of which are exacting and tiring —but tremendously rewarding to those who discover and use their own ability in such fields.

> "To be genuinely thoughtful, we must be willing to sustain and protract that state of doubt which is the stimulus to thorough enquiry so as not to accept an idea or make a positive assertion of a belief, until justifying reasons have been found."
>
> **John Dewey** in *How We Think*

The Catalyst: Chemical-Reaction Expediter

Catalytic processes are contributing vitally to the growth of the chemical industry. The author explains how research is helping to improve the methods being used in developing catalysts and discusses some problems associated with relating research in catalysis to commercial production.

by Louis J. Hillenbrand, Jr.

Chemical reactions vary widely in their speeds. Some, the flash of the photographer's flashbulb, for example, are so fast they appear to be instantaneous. Others, as the weathering of rocks, are so slow that the chemical change may not be noticeable in a lifetime. For commercial purposes, the speed of a chemical reaction usually must be somewhere in between these two extremes—neither so fast that it cannot be controlled or so slow that the output of the process is negligible. The development of methods for controlling such reactions is an important task of the chemist.

In many processes, competing reaction paths may exist. To make a process as efficient as possible, the chemist must limit the output of the undesirable reactions. Sometimes this can be done by changing the temperature of the reaction or by modifying the concentration of reactants. More frequently, however, such changes bring about an undesirable change in other competing reaction processes or result in uncontrollable reaction rates. As an alternative, the chemist may often add a substance to the chemical system that can accelerate or slow up the desired process without the attendant loss of control or specificity. If the added substance is not consumed by the reaction process that it has hastened or retarded, or is not consumed in chemical proportion to the reaction produced, the substance is acting as a catalyst for that process. The development and use of such catalytic materials has become a highly important aspect of modern chemistry.

Although catalytic processes have existed since the earliest days of mankind, the catalytic phenomenon has been identified only in comparatively recent times. In the oldest known examples of such processes, the catalytic ingredients were present naturally in the system and so no conscious act of addition was necessary. Among such natural catalytic processes might be mentioned the water-vapor catalysis of combustion in the flame, and the action of enzymes in fermentation processes. The fermentation process appear to have been among the first catalytic processes recognized as such and deliberately carried out. The first artificial use of a catalyst to accelerate a chemical reaction is usually credited to the alchemist's use of sulfuric acid to aid the conversion of alcohol to ether.

The approach to the scientific use of catalytic action was inevitably delayed because of a lack of a satisfactory basis for interpretation. It was not until the advent of modern concepts of chemistry and physics at the end of the 18th century that the necessary concepts of atomic and molecular interaction were possible.

Berzelius gave catalysis its name in 1836, and stated the concept of a catalytic force as one exerted by

An experimental laboratory reactor for catalyst development. It provides temperature uniformity and control (ambient to 1500 F) for study of the variables that determine the performance of experimental catalysts.

certain bodies through their mere presence in the system. Thus the first recognized features of catalysts were their tendency to remain unchanged in chemical reactions and their characteristic of not appearing as products of the reaction. In 1901, Ostwald extended the concept and linked the action of a catalyst to an alteration in the rate of the slowest step in a chemical reaction. This extension opened the subject to more exact inquiry because it identified the experimental basis for observing and measuring catalytic action.

Beginning with World War I, when a variety of catalytic processes were developed, the understanding and use of catalysis began to develop rapidly in the United States. In the following years, such processes have become involved in some of the most important areas of commercial production.

In the following sections, we will consider the important aspects of catalysis that must be considered in research and some of the problems associated with relating research to commercial production.

Fundamental Considerations

The speed of a chemical reaction process is limited by the rate of the slowest step in that process. From a kinetic point of view, most chemical reactions may be pictured as a collection of relatively simple acts or steps that usually occur sequentially and often simultaneously. This picture arises from statistical considerations which show that the frequency of bimolecular collisions is much greater than the frequencies of collisions of three or more molecules. In those cases of complex mechanisms, where it appears necessary to hypothesize that a large number of molecules collide simultaneously, the chemist can usually substitute a mechanism based upon a sequence of simpler acts. When the rate of the slowest step in this sequence is altered by the addition of a substance that is not a reactant, that substance is acting as a catalyst.

The "ideal" catalyst is not involved in the stoichiometry of the reaction and so it can have no effect on the thermodynamic position of equilibrium for the reaction. Thus it follows that the altered reaction rate produced by the catalyst affects only the rate of approach to equilibrium and not the position of equilibrium itself. It also suggests that such a substance will be able to perform as a catalyst for the reverse reaction. This reciprocal activity of a catalyst in forward and reverse reaction processes has been observed for a number of catalytic systems, particularly those of hydrogenation and dehydrogenation. The argument is strictly true, however, only for systems that lie near equilibrium since the thermodynamic reasoning is valid only in this area.

It must be recognized that in practice the catalyst sometimes does not achieve the "ideal" described above, but may be consumed or changed during the reaction process. If the catalyst change is not necessary to the specified reaction process, the change usually does not disturb the validity of treating this system as a catalytic one. However, the arguments concerning the unaltered position of equilibrium, and the activity expected for the reverse reaction, no longer are necessarily true since the catalyzed reaction process may be distinctly different from the uncatalyzed one.

Catalytic Mechanisms

The action of a catalyst in altering the rate of the slowest step in a reaction process can be produced in a variety of ways.

Storage Mechanism. The surface of a catalyst phase may serve, through selective adsorption, to store one of the reactants needed for the slowest step. This storage is particularly important where the desired reactant is present in low concentration, either because of an unfavorable equilibrium in the reactant phase or because the reactant is a transitory intermediate in a competing reaction process.

Orientation Mechanism. Frequently the desired reaction process may require that the reactants have a special geometrical orientation with respect to one another before reaction can occur. The orientation produced by the catalyst, when it forms a complex with the reactant, can provide the special geometrical relationships needed to expedite the reaction. The selective adsorption of the reactant by a catalyst phase, as mentioned above, may also result from a special geometrical accommodation provided by the catalyst surface. This can lead to stereospecific action by the catalyst.

Activating Mechanism. In some cases the adsorption of the reactant upon the catalyst surface, or the forma-

Dr. Hillenbrand has long been associated with research in the field of catalysis. Among his studies at Battelle have been those on palladium oxidation, platinum dehydrogenation, and cracking catalysts. He has also investigated the effects of nuclear radiation on catalyzed reactions. In his earlier associations with the Socony-Vacuum Oil Company and the United Gas Corporation, the author was concerned with the chemistry of both the production and refining of petroleum. He received his Ph.D. degree in physical chemistry from the Illinois Institute of Technology.

tion of a complex with the catalyst in a homogeneous system, is sufficiently energetic to disturb the condition of the adjacent bonds in the reactant molcule. If this disturbance represents a strain in the direction required for the reaction process, it can supply part of the energy needed to bring the molecule to a reactive condition. This disturbance is equivalent to a reduction in the thermal activation energy for the adsorbed molecules and, if all other factors are unchanged, it will lead to an increase in the rate of the reaction.

In the above discussion the energetic adsorption that produced the activation of the reactant molecules is called chemisorption, because the energies for such adsorption processes are of the same order as the energies of chemical reactions.

Adsorption of this kind can occur on the surfaces of many different kinds of solid materials. The surface molecules participate in these adsorption processes in order to satisfy the residual chemical reactivities that remain for these exposed molecules. In metals, the reactivity that is available at such exposed surfaces produces the commonly observed phenomena of tarnishing, rusting, and oxidations of all kinds. In the development of solid catalysts, these reactive forces are modified and enhanced by generating reactive sites such as crystal edges, defects in the crystal lattice, amorphous structures, and surface irregularities.

The energy of activation of a reactant molecule can also be supplied by forces of attraction between a dissolved catalyst molecule and the reactant molecule. In this case a single phase is present, and surface phenomena are not involved. Homogeneous reaction systems of this kind are commercially important, but will not be emphasized in the following discussion.

Kinetic Considerations

If the catalyst is "dissolved" in the chemical reactant phase, the catalytic system is described as "homogeneous". When the catalyst and reactants form two or more phases so that a surface exists between them, the system is spoken of as "heterogeneous". Examples of homogeneous and heterogeneous systems for different phases are shown on page ten.

In considering the factors that influence the rate of catalytic processes, a clear distinction must be made between homogeneous and heterogeneous systems. For homogeneous systems, processes involving radical and energy chain mechanisms in gas and liquid phases, and ionic mechanisms in liquid phases, may make important contributions. For heterogeneous systems the processes that can occur at interfaces between phases must be considered. In the discussion that follows only heterogeneous reactions at the surfaces of solid catalysts will be considered. This category includes the largest variety of commercial catalytic processes.

Examples of the Classes of Catalyzed Reactions

Reactant Phase	Homogeneous System	Heterogeneous System
Gaseous	Combustion reactions: Radical generators act as chain initiators.	Catalytic cracking and reforming of petroleum.
Liquid	Acid catalyzed reactions: hydrogen-ion catalysis.	Sulfuric acid catalyzed conversion of olefins to alcohol.
Solid	Doubtful	Decomposition reactions catalyzed by products: Decomposition of Ag_2O.

For reactions that fall in this category the sequence of events that occurs at the catalyst includes:

1. Diffusion of the reactants through the reactant phase surrounding the catalyst and into the pores of the catalyst:
2. Adsorption of the reactants upon the catalyst surface;
3. Diffusion of the reactants along the surface to the sites on the catalyst surface where reaction can occur;
4. Reaction of the adsorbed reactants to form products;
5. Diffusion of the products along the surface away from the site of reaction;
6. Desorption of products from the catalyst surface; and
7. Diffusion of the products back through the surrounding phase.

Any one of these steps may limit the rate of the catalytic process, although not all are necessarily present as separate steps in any particular case. For example, desorption of the products may occur at the site of reaction without the need for diffusion of the products along the surface.

All of the features of the catalyst and reaction process discussed in the following sections are used to regulate the events of the sequence above.

The Properties of Commercial Catalysts

In many cases the catalytic substance is most conveniently used if it has been placed on another material, which serves as a support. There are a number of reasons for this. The achievement of highly active surfaces for many of the catalysts frequently is possible only when the catalyst material is dispersed on very high surface-area supports. In addition, the

greater is the capacity of a given catalyst surface for accommodating the reaction process.

For supports based upon silica or alumina gels, or combinations of these, surface area may range up to 500 or 600 square meters per gram of catalyst, the greater portion of which is located inside the pores of the catalyst particle. The size of these pores is a feature that can be controlled to a considerable extent; usually the pores range from 10 to 200 Angstrom units in diameter. Among other widely used catalyst supports mention should be made of activated carbon and activated clays. The carbons may exceed 1500 square meters per gram, and the clays usually have 250 square meters or less per gram. These materials and others are used according to their suitability to the catalyst material and the reaction process intended.

Sometimes the support can influence the chemical condition and the type and degree of crystal structure assumed by the catalyst material, and thereby it can stabilize the catalyst in the active form.

The most widely used methods for preparation of supported catalysts involve either the impregnation of the surface of a pre-formed support particle with the active catalyst ingredient, or the chemical co-precipitation of both the support and the catalyst material in an intimate mixture from solution. After suitable washing, drying, and heat treatment of the preparation, the final activation of the catalyst may involve the treatment of the resulting material with the reactant to be used, or with other gases or vapors so as to convert the catalyst to the desired chemical form. It is obvious that numerous variations in this procedure may be used to alter the physical and chemical condition of the resulting catalyst. The choice of these variations in the preparation of catalysts usually is determined by carefully investigating the importance of each variation to the performance of the reaction system.

Performance of Catalytic Reactors

The name catalytic reactor is given to that part of chemical processing equipment where catalysis takes place. In heterogeneous reactions, the catalyst is usually formed into particles of special size and shape to fit the needs of the specific reactor. These particles can be poured into a chamber to form a bed through which the reactant fluid (liquid or gas) must flow at a controlled temperature and pressure, or the catalyst can be so finely divided that it is carried along as a suspension in the reactant gases passing through the reactor—the technique of the fluidized bed reactor.

In other cases, the catalyst may be solids formed into special shapes which are held rigidly in place in the reactors. The catalyst may be coated on the walls of reaction chambers if the limitations of pressure and temperature of the reaction system demand such special treatment.

For very active catalysts, the rate of reaction upon the catalyst surface will be limited by the rate of diffusion of the reactants to the catalyst surface. Under this circumstance the rate of the reaction process is being limited by mechanical features of the system and not by the chemical activity of the catalyst or reactants. When these mechanical features have been refined as far as possible, the best possible output of the reactor has been achieved.

It can be shown that under this circumstance of transport control, the necessary length of the catalytic reactor increases with an increase in 1) the diameter of the catalyst bed; 2) the average linear flow velocity in the catalyst bed; and 3) the thickness of the stagnant diffusion-layer of fluid next to the catalyst surface.

The necessary length of the catalytic reactor decreases with an increase in 1) the diffusivity of the reactants in the fluid phase, and 2) the geometric surface area of the catalyst particles. The effects of these variables is such that a ten-fold increase in the volume of the flow of fluid to the reactor would be expected to require a doubling in the length of the catalyst bed.

When chemical reactions produce large heat changes,

The Effects of Size in Achieving Chemical Similarity Between Research and Industrial Scale Heterogeneous Catalytic Reactors

Design Variable	Research Reactor	Industrial Reactor[c]	
		Conductive Heat Transfer	Radiative Heat Transfer
Radius of the reactor	R	nR	nR
Length of the reactor	L	nL	$n^{2/3}L$
Catalyst particle size	d_p	nd_p	$n^{2/3}d_p$
Space velocity [a]	S	$n^{-2}S$	$n^{-4/3}S$
Reaction rate constant	k	$n^{-2}k$	$n^{-4/3}k$
Temperature rise in catalyst bed [b]	⌒	⌒	$n^{2/3}$ ⌒
Output of reactor	O	nO	$n^{2/3}O$

a) Space velocity is obtained by dividing the volume of reagent fluid flowing in unit time by the volume of the catalyst bed.

b) Excess temperature in catalyst bed compared to reactor wall temperature.

c) Two extreme cases are shown in which either conductive or radiative heat transfer operate exclusively in both research and industrial reactors.

the control of catalyst activity inside the bed can be difficult. For exothermic reactions, such as the important reactions of combustion and the partial oxidation of materials for production of chemicals, this is especially true. Changes in such factors as catalyst bed shape, inlet gas temperature, heat of reaction, activation energy for reaction, and thermal conductivities, alter the relative magnitudes of the rates of heat generation and heat dissipation in the catalyst bed upon which the steady-state performance of the reactor is dependent. Very minor changes in these factors may alter the performance of the reactor from one in which reaction cannot be started to one in which the hot zone quickly propagates throughout the entire bed. The situation is quite analogous to the rapid growth of the flame when a match is struck, as compared to the ineffectual spark of reaction achieved when the act of striking is not quite sufficient to ignite the match. For these same reasons, both high and low levels of activity may be achieved with the same catalyst bed depending upon the adjustment of the rate of heat generation and dissipation and the starting conditions.

Thus it is seen that the design of the catalyst must be coupled with an adequate treatment of the apparatus for the system and the conditions of operation.

From Laboratory Data to Industrial Reactors

Since some of the variables that control the performance of a catalytic reactor are sensitive to a change in the scale of the apparatus, laboratory results rarely can be translated directly into a design for an industrial reactor. Usually one or more prototype reactors are built on an intermediate scale so that the effects of relatively small changes in scale can be determined.

One method for predicting the effect of change in scale involves the expression of all the necessary variables in dimensionless ratios. These ratios, if properly chosen, can be expected to be insensitive to change in scale (dimension) and so permit comparison of reactors of different sizes.

In the discussion of chemical reactors by R. C. L. Bosworth in *Transport Processes in Applied Chemistry*, seven dimensionless ratios are defined. They are based on conservation of mass, momentum, energy, and atomic species, and upon the required conditions for similarity in the radiation and conduction of heat. Each of these ratios should be numerically identical for the laboratory and prototype reactors if complete chemical similarity is to be achieved.

For a typical heterogeneous catalytic reaction involving the flow of a fluid reactant phase over a packed catalyst bed, these seven dimensionless ratios require the prototype or industrial scale reactor to be related to the research reactor as illustrated on page 12. For this table, the data obtained from a research reactor of radius R have been used to describe a prototype of greater radius R′ ($R'=nR$).

For both cases of heat transfer the space velocity and reaction rate are maintained in inverse relation with the diameter of the vessel. This illustrates an important feature of laboratory investigation of catalysts, especially where exothermic reactions are involved: the laboratory reactor frequently requires a much more active catalyst than would be required for the same performance in the large reactor. This suggests that for such systems many of the catalysts, discarded in the laboratory as insufficiently active, may perform satisfactorily in the industrial plant; and conversely that the maximum activity achievable on a commercial scale may be difficult or impossible in the laboratory. With design treatments such as this, experienced laboratory investigators can make proper allowances in the evaluation of catalyst performance.

It should not be assumed that all violations of the above conditions for similarity will be catastrophic; the evaluation of the importance of each such violation must be determined from the laboratory experience with the reactor system in question. Thus, a failure to change the catalyst particle size (or shape) in going from the research reactor to a large-scale reactor necessarily affects somewhat the distribution of reaction within the catalyst bed, the turbulence of the fluid phase, and the fraction of heat dissipated by conduction. However, in the case of a simple chemical reaction process with small heat effects, these differences will not appreciably alter the output of the large reactor as compared to the small research-scale reactor.

The development of catalytic processes, through investigation of the factors enumerated above, has been vitally important to the growth of the modern chemical industry. Some of the methods used in this development still rank as arts, but the scientific basis for catalytic action is undergoing a thorough development. Current areas of research in catalysis include the physics and chemistry of solids and their surfaces, the study of molecular interaction and adsorption, and the identification of intermediate chemical species in reaction sequences, especially those of a transitory nature. The remarkable developments in catalytic processing in recent years are only indicative of the refinements still to be achieved through research and development in this field.

The equilateral triangle is an unusual phenomenon which appeared when a large single crystal of indium phosphide was grown. The triangle is a cavity with a depth of about one-eighth inch. Indium phosphide is a relatively new semiconductor under study by Battelle scientists. They report that it shows promise for use in transistors, rectifiers, and solar-batteries. A bipolar transistor constructed of the material is known to have shown a power gain of more than 30 decibels.

TRIANGLE IN A CRYST

NOTES from BATTELLE

CRYSTALLIZATION OF RUBBER

Crystallization of rubbers is an important factor in determining their usefulness for low-temperature applications because, when crystallized, they tend to stiffen and lose their resiliency. Many elastomers are known to crystallize readily when stressed, such as by stretching. Some may crystallize slowly without the application of stress when they are exposed to relatively low temperatures.

In a recent paper, presented before a meeting of the Rubber Division of the American Chemical Society, Robert M. Kell, Bailey Bennett, and Palmer B. Stickney of Battelle, reported the results of a study which is the first to give the crystallization characteristics of unstressed polyisobutylene. They found that the maximum rate of crystal formation in the elastomer occurs near –33 C and the crystals melt at about 1 C. A sample exposed at –55 C did not crystallize in 18 months.

A study was also made to determine the effect of copolymerization on the rate of crystal growth in unvulcanized butyl rubber. Over a period of a year and a half, with samples exposed at temperatures between –20 C and –40 C, only one sample (held at –25 C) crystallized.

The research was sponsored by the Detroit Arsenal, Department of the Army.

PILE OSCILLATOR DEVELOPED

With the development of nuclear reactors and reactor components has come the need for information on the neutron absorption properties of materials. Techniques developed for measuring such properties include the mass spectrometric, danger coefficient, and pile oscillator methods. The pile oscillator is a particularly sensitive instrument.

A modified pile oscillator has been designed, constructed, and operated at the Battelle Research Reactor. The oscillator cycles a material, whose cross section is being measured, through an annular neutron-sensitive ion chamber imbedded in the thermal column of the reactor. The amplitude of the signal within the ion chamber, generated by neutron absorption in the sample, is indicative of the thermal neutron absorption cross section. By comparing this amplitude with the amplitude of a signal generated by a sample of known cross section, the cross section of the unknown sample is determined.

Unique features of this oscillator are: (1) the use of a long graphite-rod sample carrier, part of which is always in the ion chamber and thus eliminates undesirable signals resulting from neutron scattering by the carrier; and (2) the use of a dual integrator system that compares the signal from the unknown sample with the signal from a known sample at each oscillation.

At present, for accurate cross-section data, the sensitivity of the oscillator limits its use to total absorption cross sections of one square millimeter. At these values, the limit of the accuracy of the measurements is approximately that to which the absorption cross section of the standard sample is known. Analysis of errors indicates that cross sections can be measured to accuracies within ± 5 per cent without modification of the oscillator.

NEW METALS FOR MISSILES

Builders of aircraft and missiles are looking for new materials with strength at high temperatures for use in structural parts and skins as well as in engines. Of special interest are materials that can be fabricated into sheets and formed into aircraft parts that have resistance to oxidation at their service temperatures. Possible candidates as materials to fit these needs are alloys high in chromium, cobalt, columbium, molybdenum, and vanadium. Columbium, molybdenum, and vanadium require protection from oxidation which may be provided by using suitable oxidation-resistant coatings.

Of the five alloy bases mentioned above, only cobalt- and molybenum-base alloys can be considered to be in production. Chromium is not being produced as an alloy base though it is used as an alloying addition to iron-, cobalt-, and nickel-base high-temperature alloys. Neither columbium nor vanadium are yet available in production alloys.

Battelle metallurgist, H. Russell Ogden, pointed out in a recent paper before the Southwestern Metal Congress, that there is a relationship between the melting point of a metal and its elevated temperature strength. He stated, "The maximum temperature at which a (pure) metal exhibits useful structural properties appears to be at about 40 to 50 per cent of its absolute melting point. . . . Alloying additions can increase the maximum useful temperature considerably . . ."

From a study of 100-hour rupture curves for the five metals in relatively pure states and for representative alloys, Ogden estimated the upper temperature at which they will be useful. The estimates place temperatures for vanadium-base alloys at about 1300 F, cobalt-base alloys up to 1800 F, molybdenum-base alloys to 2200 F, chromium-base alloys to 1800 to 1900 F, and columbium at 1800 F.

* CHANGING TRENDS IN FORGING

The drop forging industry has more than kept pace technologically with the whole of American industry, and the dollar volume of the forging industry has increased more rapidly than that of industry as a whole. However, to maintain this pace in the future, the Drop Forging Association was recently cautioned by Battelle's J. Harry Jackson, the forging industry will have to continue to recognize rapidly changing technological trends and make long-range plans to meet these changes.

Looking ahead, Jackson pointed up a number of important considerations for the industry. Practically every device in the future will operate at higher speed and require more power. Operating environments will become more severe as the effect of radiation on materials, as well as new extremes in temperatures, must be considered. Harder, stronger, and more-difficult-to-machine metals will be employed. Forging not only will require higher precision, but must approximate the final shape more closely; the amount of machining will have to be reduced to economize on machining costs and to conserve the amount of expensive metal going into turnings, borings, and other forms of scrap. The tools of the forging industry will be improved, said Jackson, as developments in electronics permit closer control and automation of processes.

The Battelle metallurgist said the forging industry is contributing to the rapid technological changes through research. In this country, he pointed out, there is considerable interest at the present time in the possibility of improving properties by forging shapes cast to their approximate final dimensions. Meanwhile, other nations, notably Germany and the U.S.S.R., are making rapid strides in basic studies of the flow of metal during the forging process. Still other problems await investigation, Jackson added. These involve adaptation of roll forging, better means for heating forgings more rapidly and in such a way that scaling losses can be avoided, and the improvement of the forging equipment including die making and hammer design.

* MEASURING NOZZLE EROSION

With the increasing severity in operating conditions of supersonic aircraft, the problem of erosion in turbojet fuel nozzles has become critical. These tiny nozzles operate with fuel temperatures to 400 F and at ambient temperatures of about 1200 F. The metering parts of the nozzles, which weigh only 3½ grams (an aspirin tablet is about 5 grams), must accurately control the flow of the fuel over a wide pressure range. Erosion, a constant problem, modifies the internal configuration of parts and leads to increasingly unsatisfactory performance. Therefore, it appears desirable to explore the effects of operating conditions and of design variables on nozzle erosion.

The extent and nature of erosion in the nozzles became apparent by visual examination after extended periods of engine operation. The prohibitive cost of engine operation ruled out engine tests as a means of evaluating a large number of nozzle designs. Therefore, it appeared essential to develop a laboratory technique for the purpose.

Recently, a rapid and economic technique of evaluation was reported to the Semi-Annual Meeting of the American Society of Mechanical Engineers. The technique, employing radiochemical methods, was disclosed in a paper by two Battelle technologists, Herbert R. Hazard and Peter Gluck, and Roger W. Tate, Director of Research of Delavan Manufacturing Company, which sponsored the study.

The evaluation technique is based upon a flow bench and special measurement techniques developed by Battelle technologists. Through use of the flow bench, hot fuel, under high pressure, is circulated through a heated nozzle, with temperatures and pressures closely approximating those in an engine. Thus the conditions which create erosion in nozzles can be duplicated.

The measurement technique requires the radiation

of the metering parts of the nozzle, whose erosion it is important to determine. At the conclusion of each run, the amount of radioactive material worn from the nozzle is determined by the radioactivity in the fuel. Erosion rates as low as one-millionth of a gram per hour can be readily measured by this method.

* NEWLY APPOINTED

Dr. Paul Schall, Jr. Chief, Radioisotopes and Radiation Division, with responsibility for the operation of Battelle's radioisotope laboratory and the gamma-irradiation facility. . . . **Dr. James E. Whitney,** Chief, High-Level Radiation Division, who will guide research studies involving highly radioactive materials, particularly those requiring the Institute's hot-cell laboratories . . . . **Paul R. Langdon,** Manager of Finance and Accounting, who will continue to serve as controller in addition to assuming greater responsibility for accounting, budgeting, and auditing activities.

* A satisfactory method of sealing the ends of 5/16-in-diameter fuel rods for use in a pressurized-water reactor was sought by the Westinghouse Atomic Power Divison. The problem was complicated by the fact that any exposed core material would lead to rod failure and contamination of the water cooling system.

Welding technologists J. J. Vagi and David C. Martin of Battelle report that the results of exploratory studies at the Institute indicate that resistance upset welding is the most promising method for end capping the fuel elements. Shrinkage cavities and gas porosity remain as problems, though the latter are reduced to a low level when materials are vacuum treated to remove hydrogen prior to welding.

* Among the tools important to those concerned with the beneficiation of minerals is the liquid-solid cyclone, the swirling action of which is utilized for separating and classifying materials. Over the years, the literature on this device has become extensive. As an aid to those interested in the tool, Battelle technologists Oscar F. Tangel, Robert J. Brison, and Daniel A. Jacobs have compiled a "Bibliography of the Liquid-Solid Cyclone, 1939 to 1957". Copies may be obtained by writing to the Battelle Publication Office.

Writings by STAFF Members

American Institute of Mining, Metallurgical, and Petroleum Engineers, Transactions, Metallurgical Society, v. 212, no. 1, February, 1958, contains the following papers by staff members:

Effect of Hydrogen on the Fatigue Properties of Titanium and Ti-8 Per Cent Mn Alloys. L. W. Berger, W. S. Hyler, and R. I. Jaffee, pp. 41-45.

Hydrogen additions of 390 ppm to A-55 Ti and 368 ppm to Ti-8 per cent Mn have no deleterious effect on the unnotched and notched rotating-beam fatigue properties of these materials. These amounts of hydrogen, however, are sufficient to cause severe notch-impact embrittlement in A-55 Ti and pronounced loss of tensile ductility in Ti-8 per cent Mn. The lack of embrittling effect in fatigue in the latter alloy is consistent with the postulated strain-aging mechanism of hydrogen embrittlement in α-β alloys.

Effect of Composition and Heat-Treatment on the Uniform Elongation and Flow Properties of Alpha-Beta Titanium Alloys. A. J. Griest, H. A. Robinson, and P. D. Frost, pp. 117-121.

Two classes of α-β alloys were distinguished, based on the effect of solution temperature on the uniform elongation. The behavior was rationalized in terms of the α-β ratio and the alloy content of the β existing at the solution temperature. The data indicate that in commercial practice close temperature control may be required to get maximum uniform elongation, and hence, maximum potential formability, in solution-treated sheet. Bend-test data also were obtained for the solution-treated conditions.

Solid Solubility of Uranium in Thorium and the Allotropic Transformation of Th-U Alloys. Wendell B. Wilson, Alfred E. Austin, and Charles M. Schwartz, pp. 52-55.

High-temperature X-ray diffraction studies were conducted with alloys with up to 10 wt. per cent U. Thorium will dissolve up to 2.5 wt. per cent U at 950 C, 4.5 wt. per cent U at 1150 C, and 7.5 wt. per cent U at 1250 C. Mean coefficients of expansion were calculated for Th and two alloys and for ThO_2 in contact with the Th.

American Institute of Mining, Metallurgical, and Petroleum Engineers, Transactions, Metallurgical Society, v. 212, no. 2, April, 1958, contains the following papers by staff members:

Hydrogen Solubility and Removal for Titanium and Titanium Alloys. W. M. Albrecht and M. W. Mallett, pp. 204-210.

Solubilities were determined at 600 to 1000 C and pressures of 0.05 to 10μ of Hg. Solubility increases with increasing β-phase in the alloys. Factors found to affect degassing rates are specimen size and presence of thick surficial oxide. Removal of H by heating in vacuum and in flowing inert atmospheres was studied. Practical curve predicting minimum degassing times are presented.

The Oxidation Rate of Molybdenum in Air. E. S. Bartlett and D. N. Williams, pp. 280-281.

The effects of temperature and atmosphere flow rate on oxidation were studied at temperatures from 1400 to 2200 F.

Members of the Battelle staff are authors of the recently published articles and books listed on these pages. In most cases, reprints are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.

Electron Micrographic Study of Aging in a Beta Titanium Alloy. F. C. Holden and A. P. Young, pp. 287-288. A study of a high-purity Ti-6.2 Mn alloy, in which optical and electron microscopy, X-ray diffraction, and hardness data were correlated. The specimens were heated in argon to a temperature just into the β field held for 1 hr., and water-quenched. The aging samples were heated in air for 1 hr. at 300 to 500 C. Concludes that the presence of omega phase in retained β may be correlated with the presence of small equiaxed pocks in electron micrographs, X-ray diffraction patterns, and anomalously high hardness values.

A Method for Observing the Progress of Deformation in Tensile Samples. A. P. Young and L. L. Marsh, pp. 247-249.

Plastic replicas taken from a tensile sample during the test. The record of deformation can be made as nearly continuous as is desirable by taking replicas at small strain intervals. Softened cellulose acetate sheet is pressed onto the specimen, dried, stripped off, and shadowed for examination, with Au or Al. Work was done with a uranium specimen.

A Component Case History: Information Storage Devices: A Key to Automation. II. Richard J. Bengston and Joseph E. Smith, Jr. *Computers and Automation*, v. 7, May, 1958, pp. 14-15.

Compares magnetic core, magnetic drum, magnetic disc, and magnetic tape memory systems among some 20 schemes mentioned. Tape is the cheapest but magnetic core systems have the shortest access time.

Solving Spiral Bridge Geometrics by Computer. Jack Belzer. *Civil Engineering*, v. 28, no. 5, May 1958, pp. 52-54.

Details the basic geometric problem of the intersection of a straight line with a spiral curve which was determined in the past by the use of handbook tables empirically obtained. The example presented shows how this work can be done by computers such as the IBM 650 system.

A Method of Casting Radiator-Type Fuel Elements for a Nuclear Reactor. A. W. Hare and R. F. Dickerson. *Modern Castings*, v. 33, May 1958, pp. 112-114.

The casting of perforated-hexagon subsections which were 2 and 4 inches high and about 3.9 inches wide containing 397 perforations, 0.165 inches in diameter is described. Optimum casting conditions for the Cr-U eutectic alloy were found to be a pouring temperature of 2000 F with a graphite mold temperature of 1600 F. The fact that this shape could be cast makes possible the production of such a shape without the addition of excessive machining costs.

Preparation and Some Physical Properties of Bi_2Te_3, Sb_2Te_3, and As_2Te_3. T. C. Harman, B. Paris, S. E. Miller, and H. L. Goering. *Physics and Chemistry of Solids*, v. 2, no. 3, 1957, pp. 181-190.

Preparation of the above intermetallic compounds from purified elements by several techniques is discussed. Advantages and disadvantages of the techniques are enumerated. Electrical and thermal properties are presented as functions of temperature and impurity concentration. The variation of carrier mobility with temperature is approximately $T^{-5/2}$ for As_2Te_3 and Bi_2Te_3. An anomalous variation of Hall coefficient with temperature is observed. The thermal conductivities of the three compounds are similar.

The High Temperature Kinetics of the Hydrogen-Bromine Reaction. Arthur Levy. *Journal of Physical Chemistry*, v. 62, May, 1958, pp. 570-574.

The steady-state reaction of H_2 and Br_2 has been studied in a flow system between 600 and 1470 K. The low temperature mechanism of Christiansen, Herzfeld, and Polanyi, and therefore the equations of Bodenstein and Lind's original studies, are shown to be valid at temperatures approaching flame temperature.

Iron and Nickel by Carbonyl Treatment. R. M. Lewis, J. W. Cookston, L. W. Coffer, and F. M. Stephens, Jr. *Journal of Metals*, v. 10, June, 1958, pp. 419-424.

Lateritic nickeliferous deposits (30 to 55 per cent Fe and 0.5 to 2.0 per cent Ni plus Mn and Co) have been economically treated by H reduction of the pulverized (−65 mesh) ore followed by reaction with pressurized CO. Yields of 90 per cent Ni and 80 per cent Fe are reported for optimum adjustment of the variables which are discussed individually.

Plastics Engineering 1956-1957—A Review of Developments. E. E. McSweeney and R. G. Heiligmann. *Mechanical Engineering*, v. 80, Apr. 1958, pp. 57-60.

Major developments include new thermoplastic materials that resist boiling water, progress toward automation in processing, a new technique for controlling the composition range of copolymers, improved fabrication techniques, increased use in large-scale industrial applications, a variety of new products, and the developemnt of valuable engineering data.

Ion Exchange Separation of Uranium From Thorium. R. H. Poirer, G. D. Calkins, G. A. Lutz, and A. E. Bearse. *Industrial and Engineering Chemistry*, v. 50, April 1958, pp. 613-616.

Uranium was separated and concentrated from sodium carbonate solutions of monazite sand residues using strong base ion-exchange resins, particularly Amberlite IRA-400. The interference of anions present in monazite process solutions on the exchangeability of the uranyl carbonate complex was evaluated, and exchange data were obtained on the solution prepared from a typical sample of concentrates of Brazilian sand.

New Alloy Steels Beat Process Bugaboos. D. B. Roach and A. M. Hall. *Chemical Engineering*, v. 65, May 19, 1958, p. 180 + 2 pp.

Low-carbon steels have superior resistance to intergranular corrosion and good resistance to oxidation, but tensile strength is sacrificed. Properties of low Ni, high Mn, and new stabilized grades of stainless are discussed.

Vapor Pressures and Molecular Composition of Vapors of The Sodium Fluoride-Beryllium Fluoride System. Karl A. Sense and Richard W. Stone. *Journal of Physical Chemistry*, v. 62, April 1958, pp. 453-457.

Studies of BeF_2 between 802 and 1025 C showed good agreement with previous data taken over the 802-968 C range. Thermal analysis showed the melting point to be about 545 C. Studies of the system between 509 and 1061 C indicate that the complex $NaBeF_3$ exists in the vapor phase in addition to NaF and BeF_2 and a gaseous Na_2BeF_4 complex is possible.

A Columbium Primer. Chester T. Sims. *Journal of Metals*, v. 10, May 1958, pp. 340-345.

Interest in metallic Cb and in Cb-base alloys is increasing rapidly due to their excellent potential for use at high temperatures in atomic energy and missile or jet engine applications. Occurrence, extraction, preparation, vacuum purification, fabrication, properties, alloying behavior, oxidation, and present and future uses are discussed.

What the Technological Potential Can Do to Help the Western Mining Industry. B. D. Thomas. *Mines Magazine*, v. 48, March 1958, pp. 18-20.

The U. S. basic economy is geared to a very high level, and the Western Mining Industry is a great stabilizing factor in this structure. The production of gold, uranium, and taconite illustrate this. The technological potential, viewed as the arithmetical product of technology and industrial enterprise, is the basis of the national economic level. Thus, improvements in technology through research, and in industrial enterprise through courage should result in stimulation of the Western Mining Industry, and, in turn, the national economy.

How the International Helps Your Club and You. J. Homer Winkler. *Share Your Knowledge Review*, v. 39, no. 8, May 1958, pp. 3-6.

The program of the International Association of Printing House Craftsmen is aimed at coordinating the activities of local clubs seeking to maintain effective operation in the face of rapid technological advances.

New Concepts of Printing Production in the Packaging Industries. J. Homer Winkler, American Management Association, Packaging Series No. 42, 1958, pp. 22-31.

Increased use of research methods and applied engineering in the graphic arts has resulted in numerous significant developments in the packaging field. Practical applications relating to in-line equipment, phototypesetting, pre-makeready aids, photoengraving, electrotype developments, flexographic printing, gravure processes, offset lithography, screen-process printing, and the dry litho process are described.

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AERONAUTICAL ENGINEERING

10312* Missile Guidance by Infrared. Raymond H. McFee. *Astronautics*, v. 3, no. 5, May 1958, p. 33 + 3 pages.

10313* Effect of Rib Flexibility on the Vibration Modes of a Delta-Wing Aircraft. Wilhelmina D. Kroll. *Journal of Research, National Bureau of Standards*, v. 60, no. 4, Apr. 1958, p. 335-341.

A systematic study was made to determine whether decreasing the number of ribs or making the ribs more flexible would have any appreciable effect on the vibration modes and frequencies of a delta-wing aircraft. The modes and frequencies were computed for the basic wing and for the following modifications of the basic wing: One rib outboard of the fuselage removed, two ribs removed, stiffness of ribs outboard of fuselage reduced one-half, and rib stiffness reduced nine-tenths. The results indicated that the frequencies and mode shapes of the modified wings differed little from those of the basic wing and, therefore, that changes similar to these modifications would not appreciably affect the vibration characteristics of delta wings.

10314 Transitional Correction to the Drag of a Sphere in Free Molecule Flow. R. M. L. Baker, Jr. and A. F. Charwat. *Physics of Fluids*, v. 1, no. 2, Mar.-Apr. 1958, p. 73-81.

The mechanics of collisions between molecules in front of a sphere moving at hypervelocity through a rarified atmosphere are analyzed. The study is concerned with the "transitional" regime in which molecules emitted by the surface begin to shield the body from the oncoming Newtonian stream and the net drag decreases from its free-molecular value. It is found that a simplified, but physically significant model can be formulated, and that it leads to a dependence of the drag coefficient on two transition parameters. These can be interpreted as the Reynolds number and the surface-to-free stream temperature ratio. The predictions of this theory agree qualitatively and in order of magnitude with observations.

10315 Far Transmission of Air Blast Waves. Everett F. Cox. *Physics of Fluids*, v. 1, no. 2, Mar.-Apr. 1958, p. 95-101.

A semiacoustic theory of blast energy propagation, incorporating Sachs' scaling modified for altitude of observation, gives excellent agreement with experiments, providing Hilliar's similarity principle is restricted to similar ambient (weather) conditions. Comparisons between this theory and experiments are made for free air (no reflections) blast pressures; ground-level blast pressures in an isothermal, still atmosphere; blast pressures under a linear temperature inversion.

10316 Project Satellite. Kenneth W. Gatland, editor. 169 pp. 1958. Allan Wingate, London. (TL796 G22p)

Four papers on development of the German V-2, the U. S. satellite project, orbital bases, and interplanetary flight.

10317* (French.) Comparison of Some Methods for the Study of Transversal Stability in the Particular Case of a Delta Wing Glider. **Comparaison de quelques méthodes d'études de la stabilité transversale dans le cas particulier d'un planeur a aile delta.** Michel Scherer and Simone Walden. *Recherche Aéronautique*, 1958, no. 62, Jan.-Feb., p. 7-12.

The responses of a glider subjected to stepped skidding were measured in flight in a reduced wind tunnel by a global method, then calculated from the linearized equations of the motion.

10318* (French.) Measuring Unsteady Aerodynamic Coefficients and Floating Tests on Experimental Models. **Mesure de coefficients aérodynamiques instationnaires et essais de flottement sur maquettes.** M. Roland Dat. *Recherche Aéronautique*, 1958, no. 62, Jan.-Feb., p. 45-56.

Expressions of aerodynamic forces; measuring the elasticity and mass properties. Different methods for measuring aerodynamic forces. Model designs for rigid wing tests. Use of metallic and plastic materials.

10319 The Russian Literature of Satellites. I. 181 pp. 1958. International Physical Index, Inc., New York. (TL796 R92)

Six reports on launching, lifetime, orbits, and uses of various kinds of artifical satellites.

*Asterisks mark items that may be used in the Battelle Library only. None of the unbound materials listed are available for interlibrary loan.

10320 Flight and Analytical Methods for Determining the Coupled Vibration Response of Tandem Helicopters. John E. Yeates, Jr., George W. Brooks, and John C. Houbolt. *U. S. National Advisory Committee for Aeronautics, Report* 1326, 1957, 31 pp. (TL521 Un3r Vis.)

A discussion of flight-test and analysis methods for some selected helicopter vibration studies is presented. The use of a mechanical shaker in flight to determine the structural response is reported.

10321 Theoretical and Experimental Investigation of the Subsonic-Flow Fields Beneath Swept and Unswept Wings With Tables of Vortex-Induced Velocities. William J. Alford, Jr. *U. S. National Advisory Committee for Aeronautics, Report* 1327, 1957, 43 pp. (TL521 Un3r Vis.)

Flow characteristics beneath the wing can be calculated if the lifting wing is assumed to be represented by a multiple arrangement (both chordwise and spanwise) of horseshoe vortices and if the effects of thickness are accounted for.

10322 Effect of Distributed Granular-Type Roughness on Boundary-Layer Transition at Supersonic Speeds With and Without Surface Cooling. Albert L. Braslow. *U. S. National Advisory Committee for Aeronautics, Research Memorandum, RM* L58A17, Mar. 10, 1958, 22 p. (TL782 Un3rm Vis.)

10323 Low-Subsonic Investigation to Determine the Chordwise Pressure Distribution and Effectiveness of Spoilers on a Thin, Low-Aspect-Ratio, Unswept, Untapered, Semispan Wing and on the Wing With Leading- and Trailing-Edge Flaps. Delwin R. Croom. *U. S. National Advisory Committee for Aeronautics, Research Memorandum, RM* L58B05, Apr. 23, 1958, 133 pp. (TL782 Un3rm Vis.)

10324 On Landing Gear Stresses. A. Gentric. *U. S. National Advisory Committee for Aeronautics, Technical Memorandum* 1422, July 1956, 45 pp. (Translated from *Docaero,* no. 25, Jan. 1954).

Presents French viewpoint on ground loads problems and discusses their current efforts and new research equipment. Includes data on tangential forces due to wheel spin-up effects and on longitudinal oscillations of landing gears.

10325 Extreme Speeds and Thermodynamic States in Supersonic Flight. Klaus Oswatitsch. *U. S. National Advisory Committee for Aeronautics, Technical Memorandum* 1434, Apr. 1958, 39 pp. (Translated from *Zeitschrift für Flugwissenschaften,* v. 4, nos. 3/4, 1956, p. 95-108.) (TL570 Untm Vis.)

10326 Ground Reflection of Jet Noise. Walton L. Howes. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4260, Apr. 1958, 56 pp. (TL570 Un3t Vis.)

From the theoretical characteristics of far-field acoustic decay, a correction-to-free-field procedure is developed for data obtained in the presence of a plane.

10327 Some Measurement of Aerodynamic Forces and Moments at Subsonic Speeds on a Rectangular Wing of Aspect Ratio 2 Oscillating About the Midchord. Edward Widmayer, Jr., Sherman A. Clevenson, and Sumner A. Leadbetter. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4240, May 1958, 45 pp. (TL570 Un3t Vis.)

Results are presented for a range of Mach number from 0.15 to 0.81, a range of reduced frequency from 0.15 to 1.32, and a range of Reynolds number from 0.60×10^6 to 9.21×10^6. A comparison of the measured aerodynamic forces and moments is made with some available published data. Comparisons are also made between the measured data and theoretical incompressible-flow coefficients obtained from the aspect-ratio theory of Reissner, the aspect-ratio theory of Lawrence and Gerber, and the two-dimensional-flow theory. Some experimental results pertaining to the influence of wind-tunnel-wall effects on nonsteady aerodynamic measurement are included.

10328 General Solutions for Flow Past Slender Cambered Wings With Swept Trailing Edges and Calculation of Additional Loading Due to Control Surfaces. E. B. Klunker and Keith C. Harder. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4242, May 1958, 55 pp. (TL570 Un3t Vis.)

The slender-wing-type analysis is used to obtain general expressions for the surface pressure, lift, and rolling moment for cambered wings with swept trailing edges.

10329 Study of Ground-Reaction Forces Measured During Landing Impacts of a Large Airplane. Albert W. Hall, Richard H. Sawyer, and James M. McKay. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4247, May 1958, 40 pp. (TL570 Un3t Vis.)

Tests were conducted on a large bomber-type airplane to determine the ground-reaction forces imposed on the main landing gear under actual landing conditions.

10330 An Experimental Investigation of Wake Effects on Hydro-Skis. Ellis E. McBride and Lloyd J. Fisher. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4251, May 1958, 34 pp. (TL570 Un3t Vis.)

Two combinations of hydro-skis were tested: two hydro-skis in tandem and three hydro-skis arranged with a single front hydro-ski. The results show that the rear hydro-ski in a tandem arrangement could have large increases in lift coefficient and small improvements in lift-drag ratio compared with a hydro-ski in undisturbed water over a limited speed range. The two rear hydro-skis in a three-hydro-ski arrangement would tend to have losses in efficiency compared with hydro-skis in undistrubed water, but the losses could apparently be prevented by carefully selecting the spacing.

10331 Flight Investigation of Effects of Retarding-Blade Stall on Bending and Torsional Moments Encountered by a Helicopter Rotor Blade. LeRoy H. Ludi. *U. S. National Advisory Committe for Aeronautics, Technical Note* 4254, May 1958, 23 pp. (TL570 Un3t Vis.)

The results of the investigation indicated that blade stall can produce large increases in periodic blade moments during high-speed flight and pull-up maneuvers.

See also: **10426** (ceramics in airframes); **10868** (missile antenna); **10885** (cooling of airborne electronic equipment); **10886** (cooling of airborne electronic equipment); **10947** (applied aerodynamics); **11010** (airborne Cinetheodolite); **11024** (ignition time of rocket motors with liquid hypergols); **11057** (optical tracking instruments); **11061** (bearings for aircraft hydraulic pumps); **11213** (fatigue of aircraft structures); **11255** (grinding and polishing missile noses).

AGRICULTURE

10332* (Russian.) The Effect of Manganese Upon the Development and Accumulation of Plastid Pigments in the Leaves of Intact or Affected Potato Plants. **Vliianie margantsa na razvitie i na nakoplenie pigmentov plastid v list'iakh zdorovogo i bol'nogo kartofelia.** N. V. Bazhanova. *Akademiia Nauk SSSR, Doklady,* v. 119, no. 2, Mar. 11, 1958, p. 382-385.

10333* The Physiology of Host-Parasite Relationship in the *Fusarium* Wilt of Cotton. III. Distribution and Derangement of Free Amino Acids. K. Lakshminarayanan. *Indian Academy of Sciences, Proceedings,* v. 47, sec. B, no. 3, Mar. 1958, p. 115-123.

The chromatographic distribution of free amino acids in roots, shoots and leaves of susceptible and resistant varieties of cotton at 6 and 12 days and in healthy and diseased states is reported. The appearance of cystine in diseased susceptible plants at the earlier age-level and its disappearance with the progress of wilt is attributed to host defence reactions. The possibility of a systemic immunological response at early stages of fungal infections is suggested.

10334 Movement of 2,3,6-Trichlorobenzoic Acid From One Plant to Another Through Their Root Systems. Paul J. Linder, James C. Craig, Jr., Frank E. Cooper, and John W. Mitchell. *Journal of Agricultural and Food Chemistry,* v. 6, May 1958, p. 356-357.

10335 Biological and Chemical Studies on the Decline of Soil Insecticides. Ulo Kiigemagi, H. E. Morrison, J. E. Roberts, and W. B. Bollen. *Journal of Economic Entomology,* v. 51, no. 2, Apr. 1958, p. 198-204.

In general, the total chloride and bioassay methods showed a high initial recovery of the insecticides from the soil, followed by a rapid decline. The specific phenylazide method showed

little insecticide change after 11 months. The decline of insecticides could not be associated with soil microorganisms or with the physical and chemical properties of the soil.

10336 Development of an Alfalfa Having Resistance to the Meadow Spittlebug. M. Curtis Wilson and Ralph L. Davis. *Journal of Economic Entomology*, v. 51, no. 2, Apr. 1958, p. 219-222.

Purdue Synthetic F. alfalfa, assigned the number A600, has been synthesized for evaluating resistance to certain insects as well as for desirable agranomic qualities. A600 is not immune, but has a high amount of resistance not found in any commercially grown alfalfa. This resistance appears to be of three types: antibiosis, tolerance, and possibly unattractiveness or non-preference.

10337 Mineral Nutrition of Carnations. J. H. L. Messing. *Journal of the Science of Food and Agriculture*, v. 9, Apr. 1958, p. 228-234.

The visual symptoms of deficiencies of most of the essential mineral nutrients are described. The effects of lack of various minerals on the growth of carnations are discussed.

10338* Effect of Zinc Upon Growth and Incidence of Perosis in Turkey Poults. F. H. Kratzer, Pran Vohra, John B. Allred, and P. N. Davis. *Society for Experimental Biology and Medicine, Proceedings*, v. 98, no. 1, May 1958, p. 205-207.

Turkey poults fed a purified ration containing an isolated soybean protein (Drackett C-1) developed perosis. Addition of zinc to the ration improved growth and markedly reduced the incidence and severity of the perotic condition.

10339 The Yearbook of Agriculture, 1957. Soil. 784 pp. 1957. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (S21 Un3y)

A series of articles, under the auspices of the U. S. Dept. of Agriculture concerned with: fertility, management practices, soil care, moisture, soil regions, and management of soils for special uses.

See also: **10375** (plant tissue culture); **10394** (viruses infecting both plants and insects); **10964** (world review of food production and consumption); **11031** (literature review on fats and oils); **11349** (atomic power in agriculture).

BIOCHEMISTRY AND BIOPHYSICS

10340* (English.) **Quantitative Micro-Determination of Proteins and Peptides.** Herman Nielsen. *Acta Chemica Scandinavica*, v. 12, no. 1, 1958, p. 38-43.

The spectrophotometric measurement of the color, produced by the biuret reaction of proteins and peptides, can be replaced by measurement of the color, produced by the Cu salt of diethyldithiocarbamic acid. In this way microgram of proteins and peptides can be determined with the same accuracy as milligram by Kjeldahl.

10341* (English.) **Hormonal Influence on the Growth of Heterologously Transplanted Ehrlich Mouse Ascites Cancer. I. Influence of Sex on the Growth of the Cancer in Hamster. II. Effect of Castration on the Growth of the Cancer in Hamster. III. Effect of Testosterone on the Growth of the Cancer in Hamster.** C. G. Ahlström and N. Stormby. *Acta Pathologica et Microbiologica Scandinavica*, v. 43, no. 1, 1958, p. 21-40.

On transplantation to hamsters, Ehrlich mouse ascites cancer grew better in females than in males. The difference was demonstrable 48 hr. after inoculation of the cancer and was pronounced on the third day. Also the amount of ascitic fluid in the inoculated females was larger than that in the males. The significance of the parallelism between the number of cancer cells and the amount of ascitic fluid is discussed. Ehrlich's mouse ascites cancer grows better in castrated male hamsters than in uncastrated, while castration of female hamsters does not influence the growth of the transferred cancer cells. Testosterone inhibits the growth of Ehrlich's mouse ascites cancer transferred to castrated male hamsters. It does not, however, influence the growth of the cancer cells in castrated female hamsters.

10342* (English.) **Squamous Metaplasia of the Respiratory Tract Epithelium. An Autopsy Study of 214 Cases. II. Relation to Tobacco Smoking, Occupation and Residence.** Knut Sanderud. *Acta Pathologica et Microbiologica Scandinavica*, v. 43, no. 1, 1958, p. 47-61.

The difference in incidence of metaplasia in men (70%) and women (43.5%) may to a certain extent be due to their different smoking habits (only 4 of the women smoked). The incidence of metaplasia in male and female non-smokers was almost equal (54% and 41% respectively). Judging from this high incidence of metaplasia in non-smokers, other causes obviously played a major role, but smoking seems to be an important factor in producing squamous epithelial metaplasia of the respiratory tract.

10343* (Russian.) X-Ray Induced Hereditarily Modified Forms of Yeast Organisms Producing Increased Amounts of Ergosterin. **Vozniknovenie pod vliianiem rentgenovskikh puchei nasledstvenno izmenennykh form drozhzhevykh organizmov, obrazuiushchikh povyshennoe kolichestvo ergosterina.** E. N. Sokurova. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 265-266.

10344* (Russian.) The Desoxyribonucleic Acid Composition of Different Species of Actinomycetes. **Sostav dezok siribonuk leinovykh kislot u razlichnykh vidov aktinomitsetov.** A. N. Belozerskii, N. V. Shugaeva, and A. S. Spirin. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 330-332.

10345 Some Possible Biological Effects of an Electric Field Acting on Nucleic Acids or Proteins. Terrell L. Hill. *American Chemical Society, Journal*, v. 80, May 5, 1958, p. 2142-2147.

The relative stability of two different states or configurations of a macromolecular system may be altered or revised by the action of an electric field. The field will shift the equilibrium between the two states in such a way as to favor the state with greater polarizability.

10346* Carcinogenic Effects of Strontium 90 Beads Implanted in the Lungs of Rats. H. Cember and J. A. Watson. *American Industrial Hygiene Association Journal*, v. 19, no. 1, Feb. 1958, p. 36-42.

Results of experiment is compatible with the hypothesis that the energy absorbed from a single intrapulmonary radiation source is less lethal than the uniform absorption throughout the lung of the same amount of energy.

10347* Incorporation of Phosphorus-32 Into Nucleic Acids and Proteins During Microgametogenesis of Tulbaghia. J. Herbert Taylor. *American Journal of Botany*, v. 45, no. 2, Feb. 1958, p. 123-131.

Chromatograms of the purine and pyrimidine bases recovered from hydrolysates of tissue sections indicate that RNA and DNA pyrimidines are quantitatively separated by 6-7 min. hydrolysis (1N HCl at 60 C) of acetic-alcohol fixed tissue and 8-10 min. hydrolysis of FAA fixed tissue.

10348* Aberrant Chromosome Movement and Spindle Formation in Meiosis of *Bromus* Hybrids. An Interpretation of Spindle Organization. Marta Sherman Walters. *American Journal of Botany*, v. 45, no. 4, Apr. 1958, p. 271-289.

The present studies are concerned with the organization and function of the spindle and the movements of chromosomes in three interspecific hybrids of *Bromus*. The various types of supernumerary division and the resulting cell clusters are described, and suggestions are made concerning certain characteristics of spindle organizers.

10349 Determination of the Minimal Carcinogenic Dose$_{50}$ of Methylcholanthrene on Mouse Epidermis. Ronald F. Gautieri and David E. Mann, Jr. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 47, May 1958, p. 350-353.

The minimal carcinogenic dose$_{50}$ (MCD$_{50}$) of methylcholanthrene necessary to induce squamous cell carcinomas on the epidermis of CF-1 mice was found to be 504 μg. applied through 21 biweekly applications of 0.02 ml. of a 0.12% solution of methylcholanthrene. The MCD$_{50}$ was confirmed by a second experiment which yielded similar results.

10350 Investigation of Drug Release From Solids. II. Theoretical and Experimental Study of Influences of Bases and Buffers on Rates of Dissolution of Acidic Solids. W. I. Higuchi, Eugene L. Parrott, Dale E. Wurster, and T. Higuchi. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 47, May 1958, p. 376-383.

The formulation is based on the Nernst-Brünner film model assuming a solution diffusion controlled process. Results of calculations predict that for a solid weak acid dissolving in an aqueous basic solution, the rates of dissolution become essentially independent of the strength of the base above certain values. The theoretical conclusions are satisfactorily substantiated by experiments on the rates of dissolution of benzoic acid in basic media of varying strength and diffusivities.

10351* Isolation of New Fractions of Antitumor Mitomycins. S. Wakaki, et al. *Antibiotics and Chemotherapy*, v. 8, May 1958, p. 228-240.

10352* (Russian.) Cultures of Ascitic Cancer Cells in Petri-Dishes, Utilized for the Selection of Antitumoral Antibiotic Producers. **Ispol'zovanie kul'tury kletok astsitnogo raka v chashkakh Petri dlia otbora produtsentov protivorakovykh antibiotikov.** I. A. Pavlenko. *Antibiotiki*, v. 3, no. 1, Jan.-Feb. 1958, p. 14-17.

Six antibiotic preparations which had previously been tested with respect to their ability to inactivate the cells of ascitic cancer by the method proposed by V. A. Talyzina were investigated with the aid of the Petri-dish procedure.

10353* (Russian.) Antibiotics With a Selective Penetration Into the Lymphatic System. **Antibiotiki s napravlennym proniknoveniem v limfaticheskuiu sistemy.** P. Málek, I. Goffman, M. Gerol'd, and I. Kolts. *Antibiotiki*, v. 3, no. 1, Jan.-Feb. 1958, p. 45-51.

The author suggests new preparations of streptomycin, neomycin, viomycin, and streptothricin, combined with carboxylated, sulphonated or phosphorylated high molecular substances.

10354* Further Evaluation of the Lyophil Process for the Preservation of *Aspergilli* and *Penicillia*. B. S. Mehrotra and C. W. Hesseltine. *Applied Microbiology*, v. 6, no. 3, May 1958, p. 179-183.

Seventy-eight different species of *Aspergillus* and 140 different species of *Penicillium* preserved by the lyophil process and stored for a period of nearly 15 yr. were tested for their viability. All of the species of the aspergilli and nearly all of the penicillia were found to be viable after this long period of storage and to have maintained their typical macroscopic and microscopic characteristics.

10355 Biochemistry of Some Peptide and Steroid Antibiotics. E. P. Abraham. 96 pp. 1957. John Wiley & Sons, New York. (QP801.A63 Ab82b)

A review of some antibiotics produced by bacteria and fungi, the bacitracins, cephalosporins. Their structural and functional relationships are compared to other antibiotics.

10356 Biological Aspects of Cancer. Julian Huxley. 156 pp. 1958. Harcourt, Brace and Co., New York. (RC262 H98b)

An extensive review covering the comparative distribution of neoplasms, tumor genetics, carcinogenic and other viruses, tumors, and epigenetics.

10357* The Effect of a Riboflavin Antagonist Upon Leukocytes of Normal and Shay Myeloid Chloroleukemic Rats. Elizabeth A. Musser and Robert W. Heinle. *Blood*, v. 13, May 1958, p. 464-474.

No benefical effect on the course of myeloid chloroleukemia in Wistar rats was observed.

10358* Disorders of the Blood in Mice Bearing Spontaneous or Transplanted Tumours. Wilhelmina J. P. R. van Ebbenhorst Tengbergen and O. Mühlbock. *British Journal of Cancer*, v. 12, no. 1, Mar. 1958, p. 81-98 + 2 plates.

Many tumor mice proved to have increased blood volumes, as a rule plasmatic, but sometimes also polycythaemic or exclusively so.

10359* Some Effects of Nitrogen and Sulphur Mustards on the Metabolism of Nucleic Acids in Mammalian Cells. R. B. Drysdale, Agnes Hopkins, R. Y. Thomson, R. M. S. Smellie, and J. N. Davidson. *British Journal of Cancer*, v. 12, no. 1, Mar. 1958, p. 137-148.

No evidence for a differential effect of HN2 on DNA metabolism was obtained from experiments with Ehrlich mouse ascites carcinoma cells incubated, *in vitro*, in ascitic plasma or from MClM mouse ascites sarcoma cells incubated *in vitro* in ascitic plasma.

10360 Hyperglycemic Action and Toxicity of the Urine of Schizophrenic Patients. F. Moya, J. Dewar, M. MacIntosh, S. Hirsch, and R. Townsend. *Canadian Journal of Biochemistry and Physiology*, v. 36, no. 5, May 1958, p. 505-510.

Extracts prepared from the urine of schizophrenic patients have greater hyperglycemic activity than similar preparations from normal subjects. Patients' extracts are quite toxic to the rabbit, but preparations from normal urine are not.

10361* Abnormal Growth Induced by Penicillin in a Strain of *Alcaligenes fecalis*. K. G. Lark. *Canadian Journal of Microbiology*, v. 4, no. 2, Apr. 1958, p. 165-177 + 2 plates.

The division rate of a penicillin-induced globular form is about one-half that of the bacillary form. Removal of penicillin results in reversion to the bacillary form. Multiplication of the globular form depends on the presence of some principle present in tryptone not required for bacillary growth in the absence of penicillin.

10362* Variation During the Cell-Division Cycle in the Penicillin Induction of Protoplast-Like Forms of *Alcaligenes fecalis*. K. G. Lark. *Canadian Journal of Microbiology*, v. 4, no. 2, Apr. 1958, p. 179-189.

The cell passes through a stage shortly before division during which is less easily induced to form crescents than at other periods in the division cycle.

10363 Nuclear Activity of Blood Cells. Vibeke E. Engelbert. *Canadian Journal of Zoology*, v. 36, no. 2, Apr. 1958, p. 131-138 + 5 plates.

Production and release of intranuclear vesicles is not a sign of degeneration, but a process by which new cells can be produced through reassociation of released nuclear materials.

10364* An Experimental Study of Triethylenethiophosphoramide (TSPA) in the Prevention of Postoperative Pulmonary Metastases. William M. Kramer and William E. Schatten. *Cancer*, v. 11, no. 3, May-June 1958, p. 463-465

Triethylenethiophosphoramide is effective in reducing the number of S-91 melanoma pulmonary metastases when administered after removal of a primary tumor. Metastases were completely prevented in some mice.

10365* The Effect of Tobacco Tar on the Bronchial Mucosa of Dogs. Edward Ernest Rockey, Marvin Kuschner, Alvin I Kosak, and Edgar Mayer. *Cancer*, v. 11, no. 3, May-June 1958, p. 466-472.

A technique is described by which test materials may be directly applied to the bronchial mucosa of dogs and their effects examined. A pilot study of the effect of tobacco tar applied in this fashion indicates that this material is capable of rapidly inducing a marked degree of squamous metaplasia.

10366 Colorimetric Analysis. v. I. Determinations of Clinical and Biochemical Significance. Noel L. Allport and J. W. Keyser. 2nd Ed. 424 pp. 1957. Chapman & Hall Ltd., London. (QD113 A157c2)

10367* (French.) Isolating a Desoxyribonucleohistone. From *Escherichia coli*. **Isolement d'une désoxyribonucléohistone à partir d'*Eschrichia coli*.** Christiane Palmade, Marie-Renée Chevallier, Alice Knobloch, and Roger Vendrely. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 17, Apr. 28, 1958, p. 2534-2537.

A typical desoxyribonucleohistone was isolated from colon bacilli that were transformed first into protoplasts by means of penicillin. The isolating technique is described.

10368* Nuclear Uptake of Labelled Adenine in the Seminal Vesicle of the Mouse. S. R. Pelc. *Experimental Cell Research*, v. 14, no. 2, Apr. 1958, p. 301-315.

Both nuclei and cytoplasm of the epithelial cells of the seminal vesicle of mice killed one day after injection were found to be well labelled in unextracted slides.

10369* Variation of Desoxyribonucleic Acid Content of Specific Chromosome Regions. H. F. Stich and J. M. Naylor. *Experimental Cell Research*, v. 14, no. 2, Apr. 1958, p. 442-445.

DNA content of one region of a giant salivary gland chromosome (*Glyptotendipes*) fluctuated independently of that of other parts of the chromosome. An increase in the larval incubation temperature from 8 to 18 C caused an 8-fold increase in the DNA content of this region of the chromosome.

10370 Typical Behaviour of Some Simple Models of Enzyme Action. Jean Botts. *Faraday Society, Transactions*, v. 54, pt. 4, Apr. 1958, p. 593-604.

In several modifications of the basic Michaelis-Menten or Briggs-Haldane scheme for enzyme action, different investigators have found that the rate v of product formation can be expressed as the ratio of two quadratics in some reaction variable x. Derivation of kinetic constants for velocity equations having this general form is discussed, and the analysis for a specific steady-state enzyme-substrate-modifier system is extended.

10371* Formation of an Arylamine by a Sulfanilamide-Resistant Strain of *Bacillus subtilis*. Sudha Joshi and A. Sreenivasan. *Indian Academy of Sciences, Proceedings*, v. 47, sec. B, no. 2, Feb. 1958, p. 55-69.

Arylamine accumulates under normal cultural conditions in peptone or in synthetic media. The presence of sulfanilamide is not necessary for its formation. Actual multiplication of cells, however, appears essential for the formation of the arylamine.

10372* A Study of Certain Dehydrogenase Activities in a Sulfanilamide-Resistant Strain of *Bacillus subtilis*. Sudha Joshi and A. Sreenivasan. *Indian Academy of Sciences, Proceedings*, v. 47, sec. B, no. 2, Feb. 1958, p. 70-77.

Dehydrogenase activities of susceptible and sulfanilamide-resistant strains of *B. subtilis* grown in peptone or semi-synthetic media have been studied with glucose, glycerol, calcium lactate, sodium pyruvate, and ethyl alcohol as substrates. The resistant strain showed a marked decrease in dehydrogenase activities with all the substrates.

10373* Serum Ribonuclease Activity. J. C. Houck and L. B. Berman. *Journal of Applied Physiology*, v. 12, no. 3, May 1958, p. 473-476.

Using a new turbidimetric method for the determination of ribonuclease (RNAase) activity, the concentration of this enzyme in human serum was estimated. The serum content of RNAase is resultant of the elaboration of the enzyme by white cells, its renal clearance, and the release of enzyme inhibitors from body tissues.

10374 Studies on the Morphology and Nucleic Acid Content of Protoplasts of *Bacillus megaterium*. P. C. Fitz-James. *Journal of Bacteriology*, v. 75, no. 4, Apr. 1958, p. 369-382.

10375* Nitrogen Metabolism, Respiration, and Growth of Cultured Plant Tissue. I. Experimental Design, Techniques, and Recorded Data. II. The Interpretation of Specific Activity Data in Tracer Experiments. III. Nitrogen Metabolism and Respiration of Carrot Tissue Explants as Revealed by Experiments With C^{14}-Labelled Substrates. F. C. Steward, R. G. S. Bidwell, and E. W. Yemm. *Journal of Experimental Botany*, v. 9, no. 25, Feb. 1958, p. 11-51 + 1 plate.

The effects of growth on the metabolism of undifferentiated plant tissue have been studied, using radioactive substrates, chromatographic techniques, and tissue-culture methods. Certain anomalies in the specific activity of carbon in various metabolites, and particularly in the data for carbon in transit to or from metabolites occur. These anomalies are explained on the basis of the heterogeneity of the cell, in terms of separate phases or compartments in the cell. There is a striking relationship between the C^{14} of glutamine and γ-aminobutyric acid and free proline and proline and hydroxyproline combined in the protein.

10376* Studies on Antibody Synthesis Initiated in Vitro. Kingsley M. Stevens and John M. McKenna. *Journal of Experimental Medicine*, v. 107, Apr. 1958, p. 537-559.

10377* Blood Pressure, Cholesterol Content of Serum and Tissues, and Atherogenesis in the Rat. The Effect of Variations in Blood Pressure on the Cholesterol Content of Serum and Tissues and on the Development of Atherosclerosis in Rats on a High Cholesterol Diet. Q. B. Deming, et al. *Journal of Experimental Medicine*, v. 107, Apr. 1958, p. 581-597 + 2 plates.

10378* Adsorption and Maturation of Poliovirus in Singly and Multiply Infected HeLa Cells. James E. Darnell, Jr. *Journal of Experimental Medicine*, v. 107, May 1958, p. 633-641.

The inoculum of poliovirus adsorbed on HeLa cells is largely inactivated. Infective virus accumulates in a monolayer sheet of cells in advance of release into the medium. The eclipse period is shorter in multiply infected cells than in those infected with a single particle.

10379* The Amino Acid Requirements of Monkey Kidney Cells in First Culture Passage. Harry Eagle, A. E. Freeman, and M. Levy. *Journal of Experimental Medicine*, v. 107, May 1958, p. 643-652 + 1 plate.

Under the conditions of the present experiments, arginine, cystine, glutamine, histidine, and tyrosine proved necessary, over and above the eight amino acids required for nitrogen balance in man.

10380* The Prolonged Growth and Survival of Ovarian Tissue of the Promethea Moth (Callosamia Promethea) in Vitro. T. D. C. Grace. *Journal of General Physiology*, v. 41, no. 5, May 1958, p. 1027-1034 + 1 plate.

Ovarian tissues from diapausing pupae of the promethea moth (*Callosamia promethea*) have survived and grown for 186 days under *in vitro* conditions. It is possible that the tissues had become adapted to the medium during their long survival, as the cells which migrated from them after 100 days showed considerably longer survival than those in earlier cultures.

10381* The Neutralization of Animal Viruses. I. A Model of Virus-Antibody Interaction. S. Fazekas de St. Groth, G. S. Watson, and A. F. Reid. **II. A Critical Comparison of Hypotheses.** S. Fazekas de St. Groth and A. F. Reid. *Journal of Immunology*, v. 80, no. 3, Mar. 1958, p. 215-235.

10382* The Autoantibody Nature of the Thyroiditis Antibody and the Role of Thyroglobulin in the Reaction. Ernest Witebsky, Noel R. Rose, and Sidney Shulman. *Lancet*, v. 1, Apr. 19, 1958, p. 808-809.

Findings suggest that the antigen involved in the autoimmunization leading to thyroiditis precipitates in the thyroglobulin fraction, and that this antigen can elicit demonstrable circulating antibodies in the same individual.

10383* The Biochemical Basis of Mental Dysfunction. II. Mental Deficiency (Amentia). Richard W. Lippman, Thomas L. Perry, and Stanley W. Wright. *Metabolism*, v. 7, May 1958, p. 274-280.

Reviews state of knowledge of phenylketonuria, galactosemia, cerebral lipoidoses, and cretinism.

10384 Methods of Biochemical Analysis. David Glick, editor. v. VI. 358 pp. 1958. Interscience Publishers, New York. (QP519 M56 Vis.)

A series of articles concerned with: new developments in the chemical determination of nucleic acids; microbiological assay of nucleic acids and their derivatives; determination of formaldehyde and serine in biological systems; new methods for purification and separation of purines; assay of serotonin and related metabolites, enzymes, and drugs.

10385 Mitotic Poisons and the Cancer Problem. John J. Biesele. 214 pp. 1958. Elsevier Publishing Co., New York. (QH605 B47m)

Concept and classification of mitotic poisons; poisoning in early and late stages; poisoning of chromosomes.

10386* Symposium on Plant Tumors. *National Academy of Sciences, Proceedings*, v. 44, Apr. 1958, p. 338-363.

10387* Modification of Ultraviolet-Induced Mutation Frequency and Survival in Bacteria by Post-Irradiation Treatment. C. O. Doudney and F. L. Haas. *National Academy of Sciences, Proceedings*, v. 44, May 1958, p. 390-401.

10388* The Initiator Cell for Slime Mold Aggregation. Herbert L. Ennis and Maurice Sussman. *National Academy of Sciences, Proceedings*, v. 44, May 1958, p. 401-411.

A few extra large cells (I-cells) possess the capacity to initiate center formation and are the initiator cells for slime mold aggregation. I-cells also induce aggregates among test populations to which they are added.

10389* The Properties of Sonic Fragments of Deoxyribose Nucleic Acid. Paul Doty, Barbara Bunce McGill, and Stuart A. Rice. *National Academy of Sciences, Proceedings*, v. 44, May 1958, p. 432-438.

Homologous samples of DNA were produced that covered a range in mol. wt. from 300,000 to 7,400,000. The mol. wt. dependence of the sedimentation constant, the intrinsic viscosity, and the radius of gyration were determined.

10390* Cellular Proliferation in the Mouse as Revealed by Autoradiography With Tritiated Thymidine. W. L. Hughes, et al. *National Academy of Sciences, Proceedings*, v. 44, May 1958, p. 476-483.

Tritium-labelled DNA revealed a higher rate of cellular proliferation than has been inferred from studies of mitotic indices.

10391 Deoxyribonucleic Acid Side-Chain Model of the Chromosomes. Drew Schwartz. *Nature*, v. 181, Apr. 19, 1958, p. 1149-1150.

Describes evidence supporting a model in which chromosome continuity involves both the deoxyribonucleic acid and the protein.

10392 Sex Chromatin in Polyploid Nuclei of Human Amnion Epithelium. Harold P. Klinger and Hans G. Schwarzacher. *Nature*, v. 181, Apr. 19, 1958, p. 1150-1152.

The constant relationship between the sex chromatin and nuclear deoxyribonucleic acid content might provide a method of estimating the extent of polyploidy in female tissues simply by inspecting the sex chromatin.

10393* (German.) Respiration and Aerobic Glycolysis of Tumor Tissue Under the Effect of 4,6 Dinitro-o-Cresol. **Atmung und aerobe Glykolyse des Tumorgewebes unter Einfluss von 4,6-Dinitro-o-kresol.** A. Locker and K. Weghaupt. *Naturwissenschaften*, v. 45, no. 8, Apr. 1958, p. 191-192.

10394* Viruses That Infect and Multiply in Both Plants and Insects. Karl Maramorosch. *New York Academy of Sciences, Transactions*, v. 20, no. 5, Mar. 1958, p. 383-393.

10395 Progress in Biophysics and Biophysical Chemistry. J. A. V. Butler and B. Katz, editors. v. VII-VIII. 362 and 409 pp. 1957. Pergamon Press, New York. (QH505 P94 Vis.)

Review papers on mechanism of discharge of the electric organs; the isohaemagglutinins; intermediary metabolism; muscle structure and theories of contraction; chloroplast structure and photosynthesis; electrochemistry of the bacterial surface; effect of radiation on DNA synthesis; the axon surface; biosynthesis of connective tissue components; physical chemistry of deoxyribosenucleic acid; and biosynthesis of protein.

10396 Iproniazid Treatment and Metabolism of Labeled Epinephrine in Schizophrenics. Oscar Resnick, Jane M. Wolfe, Harry Freeman, and Fred Elmadjian. *Science*, v. 127, May 9, 1958, p. 1116-1117.

Iproniazid treatment in man inhibits the action of monomine oxidase, but does not influence those enzymes which are responsible for the O-methylation of epinephrine.

10397 Circulating Antibody Directed Against Penicillin. Allyn B. Ley, et al. *Science*, v. 127, May 9, 1958, p. 1118-1119.

Describes the system in which this reaction is demonstrable and reports studies on the characteristics and specificity of the antibody.

10398 Inhibition of HeLa Growth by Intranuclear Tritium. Robert B. Painter, Ruth M. Drew, and Walter L. Hughes. *Science*, v. 127, May 23, 1958, p. 1244-1245.

Tritium-labeled thymidine (H^3TDR) of high specific activity is proving to be a useful label for deoxyribonucleic acid (DNA). This report demonstrates that high levels of incorporation of H^3TDR do cause radiation damage as predicted.

10399* Synergistic Reaction Between *p*-Phenylenediamine and Melanoma Components. Vernon Riley. *Society for Experimental Biology and Medicine, Proceedings*, v. 98, no. 1, May 1958, p. 57-61.

An oxygen consuming, non-enzymic reaction occurs at physiological temperatures between *p*-phenylenediamine (PPDA) and dihydroxyphenylalanine (DOPA) when the two compounds are mixed in aqueous solution at pH 7.0 to 7.5, with maximum activity, based on oxygen consumption, obtained at a DOPA-PPDA molecular ratio of approximately 2:1. Possibilities of diagnostic and chemotherapeutic applications are discussed.

10400* A New Chemical Method for Measuring Cell Populations in Tissue Cultures. Floyd C. McIntire and Muriel F. Smith. *Society for Experimental Biology and Medicine, Proceedings*, v. 98, no. 1, May 1958, p. 76-79.

The basis of this method is a simple extraction and the measurement of total purines and pyrimidines (TPP) by their absorbance at 268 mμ. A comparison of TPP/DNA to PN/DNA in 3 cell strains growing under different conditions shows that TPP is at least as good as protein nitrogen (PN) for measuring cell populations.

10401* Effect of Carbon Blacks on Carcinogenic Compounds. E. von Haam, H. L. Titus, Irving Caplan, and George Y. Shinowara. *Society for Experimental Biology and Medicine, Proceedings*, v. 98, no. 1, May 1958, p. 95-98.

Adsorption of 20-methylcholanthrene, 3,4 benzpyrene and p-dimethylaminoazobenzene to 7 different carbon blacks has been determined quantitatively. Carcinogenicity of p-dimethylaminoazobenzene was almost completely inhibited by carbon black. Administration of carbon black adsorbed 20-methylcholanthrene and 3,4-benzpyrene in combination with olive oil and acetone respectively inhibited carcinogenesis to a lesser degree.

10402* Survival of Mouse-Grown Rat Erythrocytes. L. H. Smith and J. Toha. *Society for Experimental Biology and Medicine, Proceedings*, v. 98, no. 1, May 1958, p. 125-128.

A study was made of survival of Cr^{51}-labeled erythrocytes from irradiated mice that had been given rat bone marrow. Survival of these erythrocytes (mouse-grown rat erythrocytes) in both mice and rats was compared with survival of normal rat and normal mouse erythrocytes in mice and rats. The data show that erythrocytes of X-irradiated mice (950 r) given rat bone marrow are of rat origin since their survival time in the rat is essentially the same as the survival time of normal rat erythrocytes in the rat.

10403* Observations on Bacteriostatic and Bactericidal Action of Erythromycin. Laurence Unger and Arnold Kisch. *Society for Experimental Biology and Medicine, Proceedings*, v. 98, no. 1, May 1958, p. 176-178.

Erythromycin was bactericidal to low cell concentrations of growing *S. aureus* but not to heavy suspensions of the same growing cells. Turbidity of the heavy suspension continued to increase after addition of erythromycin, although at a reduced rate. This increase was not paralleled by any increase in viable units. Viable cells in a drug-treated suspension were still as sensitive to erythromycin as before addition of the drug. Addition of a filtrate of a drug-treated, dense suspension to a dilute suspension of growing cells delayed onset and reduced the rate of sterilization of these cells by erythromycin.

10404* Storage of Pyrimethamine in Cells *in vitro*. M. Katherine Cook and Leon Jacobs. *Society for Experimental Biology and Medicine, Proceedings*, v. 98, no. 1, May 1958, p. 195-198.

Storage of pyrimethamine or active products of pyrimethamine occurs in tissue cultures of monkey kidney treated with the drug. Chick embryo heart explants, HeLa cells and human intestinal cells are also able to store pyrimethamine in levels inhibitory to *Toxoplasma* parasitism.

10405* (English.) **The Organic Chemistry of Deoxynucleosides and Deoxynucleotides.** A. M. Michelson. *Tetrahedron*, v. 2, nos. 3/4, May 1958, p. 333-344.

A review of recent work on the chemistry of degradation products of deoxyribonucleic acid. Concludes that the outstanding chemical problems in this field concern the synthesis of the naturally occurring deoxynucleosides, development of methods for the synthesis of a number of purine and pyrimidine di- and tri-nucleotides, the polymerization of deoxynucleotides or nucleotide derivatives to a degree when the product could legitimately be called a deoxyribonucleic acid, and devising a suitable method for the determination of sequence in the polynucleotide chain.

10406 On the Mechanism of Skeletal Fixation of Strontium. J. Boyd, W. F. Neuman, and H. C. Hodge. *U. S. Atomic Energy Commission, UR-512*, Mar. 14, 1958, 16 pp. (UF767 Un3.1ru Contin.)

Strontium ions from the extracellular fluids, diffusing into the bone areas, enter into the hydration jackets surrounding the individual bone crystals and exchange with certain calcium ions in the surfaces of mineral crystals. With passing time, these Sr ions become incorporated to some extent within the crystals, presumably as the result of thermal diffusion and recrystallization.

10407 The Efficient Separation of Lymphocytes From Normal Human Blood. Benedict Cassen, Julianne Hitt, and Esther F. Hays. *U. S. Atomic Energy Commission, UCLA-425*, May 2, 1958, 11 pp. (UF767 Un3.1uc Contin.)

A method of producing *in vitro* phagocytosis of gum arabic-coated iron spherules by neutrophilic leukocytes of human blood is reported. Centrifugation of blood with neutrophils containing iron will produce an efficient separation of lymphocytes.

10408* Failure of Self-Inhibition in Tumors. S. Meryl Rose. *U. S. National Cancer Institute, Journal*, v. 20, no. 4, Apr. 1958, p. 653-664.

Self-limitation may in general result from the accumulation of specific products. Possibly the failure of malignant tumors to achieve self-limitation because of excessive deaths could be compensated for by the addition of sufficient quantities of their aberrant products.

10409* Factors Determining Homograft Destruction and Immunological Enhancement in Mice Receiving Successive Tumor Inocula. Nathan Kaliss and Bradley F. Bryant. *U. S. National Cancer Institute, Journal*, v. 20, no. 4, Apr. 1958, p. 691-704.

10410* Tumor-Damaging Activity in Plant Families Showing Antimalarial Activity. Amaryllidaceae. D. B. Fitzgerald, J. L. Hartwell, and J. Leiter. *U. S. National Cancer Institute, Journal*, v. 20, no. 4, Apr. 1958, p. 763-774.

10411* Histocompatibility Genes of the Mouse. I. Demonstration of Weak Histocompatibility Differences by Immunization and Controlled Tumor Dosage. George D. Snell. *U. S. National Cancer Institute, Journal*, v. 20, no. 4, Apr. 1958, p. 787-824.

10412* Transplantation of Homologous Erythropoietic Elements in Rats After Sublethal Doses of X Radiation. T. T. Odell, Jr. and B. C. Caldwell. *U. S. National Cancer Institute, Journal*, v. 20, no. 4, Apr. 1958, p. 851-858.

Long-lasting and extensive transplants of donor marrow were observed in about a fourth of the rats that received 300 or 500 r of X-rays (LD50/30 days, 725 r). There were no permanent transplants in rats that received 225 r or less, although a small number of the donor-type red cells were seen in the circulation for a few weeks in some animals.

10413* Structural Studies on the Proteins of Bacteriophages. I. Alkaline Dissociation of the Protein Coat "Ghost" of Bacteriophage T2r. Helen Van Vunakis, Winfield H. Baker, and Ray K. Brown. *Virology*, v. 5, no. 2, Apr. 1958, p. 327-336.

See also: **10485** (infrared analysis of steroids); **10609** (amino acid synthesis); **10623** (degradation and synthesis of peptides and proteins).

CERAMICS AND CONCRETE

10414* (Spanish.) Basic Considerations on the Use of Refractories. **Consideraciones fundamentales sobre el empleo de los materiales refractarios.** Luis Dalmau Castells. *Acero y Energia*, v. 15, no. 86, Mar.-Apr. 1958, p. 43 + 8 pages.

Review of properties of various types of refractories. Methods for selecting and testing.

10415* (Russian.) The Significance of Rheological Curves of Ceramic Bodies for Ceramic Technology. **Znachenie reologicheskikh krivykh keramicheskikh mass dlia tekhnologii keramiki.** S. P. Nichiporenko. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 4, Feb. 1, 1958, p. 785-787.

10416* (Russian.) Effect of Grinding on the Dielectric Properties of Polycrystalline Barium Titanate. **O vliianii shlifovki na dielektricheskie svoistva polikristallicheskogo titanata bariia.** G. M. Kovalenko. *Akademiia Nauk SSSR, Seriia Fizicheskaia*, v. 22, no. 3, Mar. 1958, p. 321-322.

10417 High-Temperature Mechanical Properties of Ceramic Materials. I. Magnesium Dititanate. E. A. Bush and F. A. Hummel. *American Ceramic Society, Journal*, v. 41, June 1958, p. 189-195.

Thermal expansion, modulus of rupture, and modulus of elasticity of sintered Mg dititanate were measured as functions of temperature and thermal history. The values increased with increasing temperature up to 1000 C, and hysteresis effects were found during cooling. Delayed strain effects were observed. These phenomena were attributed to the occurrence and recombination of internal fractures that result from stresses arising from the high anisotropy of thermal expansion of Mg dititanate.

10418 Etching of Refractories and Cermets by Ion Bombardment. T. K. Bierlein, H. W. Newkirk, Jr., and B. Mastel. *American Ceramic Society, Journal*, v. 41, June 1958, p. 196-200.

Uranium oxide, aluminum oxide, and porcelain, as well as aluminum-aluminum oxide (SAP), a Ni-Ti carbide base cermet (Kentanium K-152-B), and a cobalt silicide-titanium carbide, titanium diboride cermet (designated III-B), typical examples of refractories and cermets, were satisfactorily etched by ion bombardment for subsequent optical and electron microscope study. The method used is similar in almost all respects to the ion etching of metallic specimens. Representative optical and electron micrographs illustrate the applicability of the method for developing the microstructure of refractories and cermets.

10419 Calculation of Temperature Distributions in Glass Plates Undergoing Heat-Treatment. Robert Gardon. *American Ceramic Society, Journal*, v. 41, June 1958, p. 200-209.

A method is presented for calculating temperature distributions in diathermanous sheets that are being heated or cooled. It differs from previous calculations of this type in that it takes a more comprehensive account of radiative effects that play a part in these processes. Principally, these effects are the penetration of external radiation into the sheet, the emission and partial reabsorption of radiation within the sheet, and multiple internal reflection between the surfaces of the sheet. A high-speed digital computer was programmed to perform these calculations.

10420 Some Properties of Glasses in the System Barium Oxide-Boric Oxide-Silica. Edgar H. Hamilton, G. W. Cleek, and O. H. Grauer. *American Ceramic Society, Journal*, v. 41, June 1958, p. 209-215.

Densities, refractive indices, liquidus temperatures, and primary phases of glass compositions in the glassforming region of the system BaO-B_2O_3-SiO_2 were determined. Anomalous changes in properties were observed for a continuous change in composition. The possibility that there is a relation between the compounds indicated by the phase diagram and the actual units in the glass is suggested.

10421 Subsolidus Relations Between Mullite and Iron Oxide. Wayne E. Brownell. *American Ceramic Society, Journal*, v. 41, June 1958, p. 226-230.

Subsolidus relations were studied to increase the understanding of the properties of fired clay products. Solid solutions of ferric oxide and mullite were measured in the temperature range 1000 to 1300 C. The solid solutions were characterized by an increase in the lattice dimensions of mullite, by increases in the indices of refraction, and by changes in color. Ferrous oxide did not enter into solid solution with mullite, but reacted with it to form ferrous aluminate and ferrous silicate.

10422* Strength of Concrete Under Combined Tensile and Compressive Stress. Douglas McHenry and Joseph Karni. *American Concrete Institute, Journal*, v. 29, no. 10, Apr. 1958; *ACI Proceedings*, v. 54, 1958, p. 829-839.

Thin-wall unreinforced cylinders were tested to failure under the action of axial compression applied by a testing machine together with circumferential tension developed by means of internal hydrostatic pressure. Results are analyzed in terms of octahedral stresses.

10423* Creep of Plain and Reinforced Concrete. P. G. Fluck and G. W. Washa. *American Concrete Institute, Journal*, v. 29, no. 10, Apr. 1958; *ACI Proceedings*, v. 54, 1958, p. 879-895.

A general discussion based on a review of 121 English references on laboratory and field tests.

10424* (English.) **Some New Compounds in the System Cesium Oxide-Boron Oxide.** J. Krogh-Moe. *Arkiv för Kemi*, v. 12, no. 3, 1958, p. 247-249.

Five new compounds in the acid range of the system are characterized.

10425 Cement and Concrete. 152 pp. 1958. American Society for Testing Materials, Philadelphia. (TA435 Am35c)

These eight papers deal with certain subjects not commonly covered in technical bibliographies, such as hydrophobic cement, along with more common subjects such as the effect of aggregate on the resistance of concrete to abrasion.

10426 Ceramic Materials for Airframes. H. R. Miller and W. H. Wheeler. *Ceramic Age*, v. 71, no. 4, Apr. 1958, p. 36 + 5 pages.

Presently used and potential areas for utilization of ceramic components are discussed.

10427 Ceramic Fabrication Processes. W. D. Kingery, editor. 235 pp. 1958. Massachusetts Institute of Technology, Cambridge, and John Wiley and Sons, New York. (TP807 K59c)

Surveys current and potential developments in slip casting, plastic and pressure forming, drying, firing, and effects of microstructure on properties of the fired ware.

10428* (German.) Vacuum Tight Metal-Ceramic Seals. **Vakuumdichte Metall-Keramik-Verbindungen.** Karlernst Müller. *ETZ: Elektrotechnische Zeitschrift*, v. 10, Ausgabe B, no. 3, Mar. 1958, p. 69-71.

In preparing vacuum tight brazed seals between ceramic and metallic elements, different alloys were tested. A Ag-Ti alloy proved the most suitable.

10429* Instrumentation in Cement and Concrete Research. I. Rolt Hammond. *Instrument Practice*, v. 12, Apr. 1958, p. 380-387.

Structures testing machines; strain measurement; chemistry and physics laboratories; fundamental research; covermeter.

10430* Precision Lead Alumino-Silicate Dielectric Ceramics Having Zero Firing Shrinkage. Barlane R. Eichbaum. *Insulation*, v. 4, May 1958, p. 18-23.

Dense ceramic bodies within the compositional range: PbO, 47.5-83.9%, alumina 2.5-27.2%, and silica 10.8-35.0% when fabricated from commercial raw materials and by conventional fabricating methods exhibit low firing shrinkage. When fabricated at sufficient pressures, which depend on compositions, bodies of zero firing shrinkage are attained.

10431 Effect of Origin Flaw Characteristics on Glass Strength. W. C. Levengood. *Journal of Applied Physics*, v. 29, May 1958, p. 820-826.

Experiments indicate two different mechanisms of fracture.

10432* (Russian.) Problem of Cement Hardening. **Voprosy tverdeniia tsementa.** A. S. Panteleev. *Khimicheskaia Nauka i Promyshlennost'*, v. 3, no. 1, 1958, p. 22-26.

Hydration of clinker materials; processes taking place during cement hardening; structure and strength of the hardened cement.

10433* (Russian.) Highly Refractory Materials for Today's Metallurgy. **Vysokoogneupornye materialy dlia sovremennoi metallurgii.** P. S. Mamykin. *Khimicheskaia Nauka i Promyshlennost'*, v. 3, no. 1, 1958, p. 27-34.

High-refractory products based on pure oxides, non-oxide compounds, magnesite and silicate; magnesite-chromite, periclase-spinel, and other products.

10434* (Russian.) Glass Fiber and the Materials Based on It. **Stekliannoe volokno i materialy na ego osnove.** M. S. Aslanova. *Khimicheskaia Nauka i Promyshlennost'*, v. 3, no. 1, 1958, p. 72-76.

Properties, production, and application.

10435 Grinding Ball Size Selection. Fred C. Bond. *Mining Engineering*, v. 10; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 211, May 1958, p. 592-595.

The proper size of make-up balls or rods to be added regularly to grinding mills can be calculated. The amount will vary with the character of the balls and the abrasiveness of the material being ground. However, it is primarily dependent on the power input to the mill, and estimates of the amount required for new installations should be based upon the power used.

10436* (German.) Microstructure of Filters Made of Kieselguhr and Glass. **Mikrostruktur von Filtern aus Kieselgur und Glas.** Hartmut Haupt. *Silikattechnik*, v. 9, no. 2, Feb. 1958, p. 62-67.

10437* (German.) Production, Properties and Application of Some Oxide-Base High Temperature Materials. **Herstellung, Eigenschaften und Anwendung einiger oxydischer Hochtemperaturwerkstoffe.** Walter Richter and Karl Pump. *Silikattechnik*, v. 9, no. 2, Feb. 1958, p. 74-77.

Working methods and important technical properties of materials such as zirconia, beryllia, magnesia, and calcia. Present fields of application. Rare high temperature oxides.

10438 An Investigation of the Dielectric Relaxation Exhibited by Glass. I. Theory and Methods of Measurement. H. E. Taylor. *Society of Glass Technology, Journal*, v. 41, Dec. 1957, p. 350T-382T.

10439 Selenium Utilization in Soda - Lime - Silica Glass Manufacture. D. K. Hill, compiler. *Society of Glass Technology, Journal*, v. 42, Feb. 1958, p. 3T-19T.

Economics of use of Se and other decolorizers; effect of batch parameters. Possibility of using other materials as substitutes for Se e.g. MnO_2 and Te. Various concentrations of Fe_2O_3 glasses are covered as well as the effects of As and $NaNO_3$ in the batch.

10440 The Problem of Instrumentation on Glass Melting Tanks. G. R. Mattocks. *Society of Glass Technology, Journal*, v. 42, Feb. 1958, p. 32T-53T.

Glass manufacturers hold various opinions on the use of control instruments on glass melting tanks. The interaction between the combustion conditions and the flow of glass is discussed.

10441* (German.) Determination of the Grinding Mechanism in Typical Cylindrical Batch Grinders. **Bestimmung des Mahlmechanismus in typischen Trommelmühlen.** Tatsuo Tanaka. *Staub*, v. 18, May 1958, p. 137-142.

In a general examination of the process of reduction and equation is proposed which is valid not only for frictional grinding, but also for impulse grinding. Effects of grinding variables on particle size distribution.

10442* (Russian.) Calculation of the Temperature of the Maximum Velocity of Crystallization of Glass. **Raschet temperatury maksimal'noi skorosti kristallizatsii stekol.** M. B. Epel'baum. *Steklo i Keramika*, v. 15, no. 4, Apr. 1958, p. 22-26.

10443* (Russian.) Apparatus for the Continuous Electrophoretic Dehydration of Ceramic Suspensions. **Ustanovka dlia nepreryvnogo elektroforeticheskogo obezvozhivaniia keramicheskikh suspenzii.** N. K. Antonevich. *Steklo i Keramika*, v. 15, no. 4, Apr. 1958, p. 30-35.

10444* (German.) Investigation of Raw Cement Mixtures With a Very High Silicate Modulus. **Untersuchungen an Zementrohmischungen mit sehr hohem Silikatmodul.** Kl. Dyckerhoff. *Technische Mitteilungen Krupp*, v. 16, no. 1, Apr. 1958, 21 pp.

The combustibility of five siliceous limestones was analyzed, and the lime bond determined as a function of various silica carriers, such as quartz, quartzite, plastic refractory clay, and cristobalite.

10445* (Russian.) Crystallization of Bi- and Tri-Calcium Silicates in High Ferric Oxide Cements. **O kristallizatsii dvukhkal'tsievogo i trekhkal'tsievogo silikatov v tsementakh s vysokim soderzhaniem okisi zheleza.** N. A. Toropov and I. A. Bondar'. *Tsement*, v. 24, no. 1, Jan.-Feb. 1958, p. 18-22.

Study of the crystallization process of seven compositions of CaO-Al_2O_3-SiO_2-Fe_2O_3 system corresponding with the slag cements. Effect of temperature and holding time on the crystallization process.

10446* (Russian.) Stability of Portland Cement Minerals in Water, H_2SO_4 and NaOH Solutions. **Stoikost' mineralov portland-tsementa v vode, v rastvorakh sernoi kisloty i edkogo natra.** N. A. Mashchanskii. *Zhurnal Prikladnoi Khimii*, v. 31, no. 3, Mar. 1958, p. 333-338.

10447* (Russian.) Resonance Method of Investigation of the Strength of Concrete in Aggressive Media. **Rezonansnyi metod issledovaniia stoikosti betona v agressivnykh spedakh.** V. V. Stol'nikov. *Zhurnal Prikladnoi Khimii*, v. 31, no. 4, Apr. 1958, p. 559-566.

See also: **10497** (slag and refractory analysis by infrared spectroscopy); **10554** (NaCl in glass); **10752** (opaque systems for ceramics); **10760** (ceramic coatings in corrosion control); **10811** (dielectric properties of Ba-La-Sr titanate); **10831** (electrical breakdown of porcelain insulators); **10863** (ceramic foam for electronic equipment); **11257** (Russian ceramic cutting tools); **11259** (ceramic cutting tools); **11270** (use of ceramic cutting tools); **11385** (clay-type radiation sources); **11386** (preparation of ceramic fuel elements); **11433** (ball mill grinding at supercritical speed); **11453** (magnetic properties of $BaTiO_3$); **11473** (properties of Ba-Pb-Ca titanates); **11558** (glass fibers in paper).

CHEMICAL ENGINEERING

10448 Advances in Chemical Engineering. Thomas B. Drew and John W. Hoopes, Jr., editors. v. II. 338 pp. 1958. Academic Press, New York. (TP155 Ad95)

Presents critical summaries on boiling of liquids, automatic process control, treatment and disposal of nuclear wastes, high vacuum technology, separation by adsorption methods, and mixing of solids.

10449 New Processes and Technology. *Chemical Engineering*, v. 65, May 5, 1958, p. 125-138.

An inventory of significant technical developments in the chemical process industries for the period starting with July 1956. Includes ceramics, chemicals, metals, petroleum, nuclear materials, plastics, rubber, pulp, and synthetic fibers.

10450* Vapour-Liquid Equilibria in the Ternary System Ethyl Acetate-Benzene-*Cyclo*hexane. K. C. Chao and O. A. Hougen. *Chemical Engineering Science*, v. 7, no. 4, 1958, p. 246-260 + 2 plates.

Covers the entire composition range under isobaric conditions of 760 mm Hg.

10451* Filtration. H. K. Suttle. *Chemical & Process Engineering*, v. 39, Apr. 1958, p. 125-131.

Theoretical and practical advances; filter aids; filter media; filtration in air pollution control; chemical processes.

10452 Reprocessing Package Cuts Fuel Costs. *Chemical Week*, v. 82, May 10, 1958, p. 31-32.

Describes a new package-type of fuel-recovery unit to be built next to a nuclear power reactor. Designed for complete remote control, the plant will enable nuclear power plant operators to recover valuable fuel.

10453* (German.) The Hydrating Medium-Pressure Refining of Lignite-Tar Oils With the Aid of a Twin Chamber. **Hydrierende Mitteldruckraffination von Braunkohlenteermittelölen mit Hilfe einer Zwillingskammer.** Richard Birthler, Erwin Deutloff, and Christian Szkibik. *Chemische Technik*, v. 10, no. 2, Feb. 1958, p. 75-78.

Discusses process conditions for refining coal-tar oils with high molecular heterogeneity.

10454* (French.) Production of Commercial Dodecylbenzene From a Narrow Kerosene Cut From Hydrogenated Spanish Shale-Oil. **Fabrication de dodécyl-benzène commercial partant d'une coupe étroite de kerosène provenant d'huile hydrogénée de schistes bitumineux espagnols.** Roman Martinez Gayol. *Chimie & Industrie*, v. 79, no. 3, Mar. 1958, p. 283-289.

High yields and quality of the chlorinated compounds and the alkylated derivatives. Three directions of use are given.

10455* Commercial Production of Synthesis Gas From Low Grade Coal. III. Gas Purification. John A. Linton and Gordon C. Tisdall. *Coke and Gas*, v. 20, Apr. 1958, p. 148 + 5 pages.

Details of the Rectisol process, which involves washing gas with methanol at high pressure and low temperature.

10456 Improving Fractionator Performance With Dynamic Analysis. Fred A. Woods. *Control Engineering*, v. 5, May 1958, p. 91-95.

Shows how an unstable fractionator yielded a significant payout after dynamic analysis was used to calculate controller settings.

10457* (German.) Experimental Investigations Into Drying With Infrared Rays in the Constant-Rate Period. **Experimentelle Untersuchungen über die Trocknung mit infraroten Strahlen im nichthygroskopischen Bereich.** Wolfgang Koch. *Forschung auf dem Gebiete des Ingenieurwesens* (Ausgabe B), v. 24; *VDI-Forschungsheft* 465, 1958, 40 pp.

Drying tests using a special test canal which allowed for setting up any desired state of the drying air and for applying different radiation sources.

10458* (Japanese.) **Studies on the Evaporation and Combustion of the Calcium-Base Sulfite Waste Liquor. III. Calculation of the Heat Balance in the Evaporation and Combustion of Clarified Liquor.** Tadashi Shogenji and Hideo Takahashi. **IV. Applicability of the Smelt Sodium Sulfide to the Alkaline Purification of Pulp.** Tadashi Shogenji and Shigeru Tomita. **V. Utilization of Smelt for Kraft Pulping of Sulfite Knot Rejects.** Tadashi Shogenji and Akio Mita. *Government Chemical Industrial Research Institute, Tokyo, Reports*, v. 53, Jan. 1958, p. 1-22.

10459 Chemical Exchange. II. D. R. Augood. *Industrial Chemist*, v. 34, Apr. 1958, p. 181-190.

Various systems used to effect countercurrent contact between exchanging reactants; problem of securing reflux in the basic type of exchange process using a single tower; reflux ratio; effects of pressure, temperature, and ionic strength on the process separation factor.

10460 Machine Solution of a Boundary Value Problem for a Continuous Arosorb Process. Andre W. Pollock, Millard F. Brown, and Carl W. Dempsey. *Industrial and Engineering Chemistry*, v. 50, May 1958, p. 725-729.

Adsorption equations based on a Langmuir isotherm were derived for a simplified model of the adsorption zone of the column and solved by numerical methods on an IBM 650 electronic computer.

10461 The Effect of Temperature on Bursting Discs. H. R. Wright. *Institution of Chemical Engineers, Transactions*, v. 36, no. 2, 1958, p. 69-78.

Tests were carried out over the temperature range −80 to +400 C on Al, Cu, Ni, Monel, 18/8/Ti steel, mild steel, Ag, Pt, and Pd.

10462* (Russian.) Experiments of Obtaining Acetylene by Means of Electrocracking of Natural Methane on a Pilot Plant Scale. **Opyty po polucheniiu atsetilena elektrokrekingom pripodnogo metana na ukrupnrnnoi ustanovke.** E. N. Eremin. *Khimicheskaia Promyshlennost'*, 1958, no. 2, Mar., p. 73-80.

10463* (Russian.) Mechanical Removal of Liquid by Secondary Steam in Evaporation Vessels. **Mekhanicheskii unos zhidkosti vtorichnym parom v vyparnykh apparatakh.** N. I. Gel'perin and V. B. Kogan. *Khimicheskaia Promyshlennost'*, 1958, no. 2, Mar., p. 96-101.

10464* (Hungarian.) Dissolving Rate of Ethylene in Aqueous Suspensions of Different Substances. **Etilén oldódásának sebessége különböző anyagok vizes szuszpenziójában.** Ferenc Nagy and Géza Schay. *Magyar Kémiai Folyóirat*, v. 64, no. 3, Mar. 1958, p. 81-84.

When ethylene is dissolved in aqueous suspensions the reaction rate depends on the dispersion and concentration of the liquid and on the number of revolutions of the agitator. Behavior of absorbent suspensions.

10465* UF$_4$ Production in Uranium Mills. Ray S. Long, David A. Ellis, and James E. Magner. *Mining Congress Journal*, v. 44, Apr. 1958, p. 74-76.

Production of nuclear-reactor-grade products by U mills instead of crude cake eliminates some of the equipment and raw materials involved in present recovery. No HNO_3 is used or H_2 reduction needed, resulting in over-all savings.

10466* Sulphur Production and Acid Recovery Units. *Petroleum*, v. 21, May 1958, p. 151-153.

Sulfur recovery unit produces elemental S from H_2S. Acid recovery unit decomposes sludge acid from alkylation and *iso*-pentane treatment units and regenerates it as pure 98% H_2SO_4 for reuse in the units.

10467 Better Estimate of Entrainment From Bubble-Cap Trays. J. R. Fair and R. L. Matthews. *Petroleum Refiner*, v. 37, Apr. 1958, p. 153-158.

Design charts for estimating both entrainment and flooding.

10468 Applied Hydrocarbon Thermodynamics. IV. Compressibility Factors and Equations of State. Wayne C. Edmister. *Petroleum Refiner*, v. 37, Apr. 1958, p. 173-179.

Working correlations and graphs.

10469 Phase Relations of Gas-Condensate Fluids. v. I. Test Results, Apparatus, and Techniques. C. Kenneth Eilerts, et al. 439 pp. 1957. American Gas Assn., New York. (TN21 Un3mo Vis.)

10470 Fuel-Processing Research and Development. *Reactor Fuel Processing*, v. 1, no. 1, Feb. 1958, p. 7-26.

Reports new work in solvent extraction, ion exchange, fluoride volatility processes, pyrometallurgical processing, corrosion, and homogeneous reactor processing.

10471 Extraction Efficiency of a Pulse Column of Varied Geometry. Lawrence E. Burkhart and R. W. Fahien. *U. S. Atomic Energy Commission, ISC-860*, June 1956, 44 pp. (UF767 Un3.1is Contin.)

10472 A Summary of the Separation Operations. M. E. Whatley. *U. S. Atomic Energy Commission, ORNL-2477*, Apr. 11, 1958, 101 pp. (UF767 U3o Contin.)

Distillation, gaseous diffusion, solvent extraction, and ion exchange operations are discussed.

10473 Thorex Process: Third Uranium Cycle Studies. J. R. Oliver. *U. S. Atomic Energy Commission, ORNL-2473*, Apr. 14, 1958, 15 pp. (UF767 U3o Contin.)

A Thorex third cycle uranyl nitrate feed containing 50 g of U per liter should be 0.70 *M* in $Al(NO_3)_3$ and 0.50 *M* in HNO_3; the scrub, 0.50 *M* in $Al(NO_3)_3$; the extractant, 10 vol. % tributyl phosphate (TBP) in Amsco; and the feed/scrub/extractant flow ratios, 1/0.3/1.5.

10474 The Use of Tri-n-Octylphosphine Oxide in the Solvent Extraction of Zirconium. J. C. White and W. J. Ross. *U. S. Atomic Energy Commission, ORNL-2498*, Apr. 24, 1958, 37 pp. (UF767 U3o Contin.)

Complete extraction of Zr from sulfate, fluoride, and tartrate solutions can be achieved with multiple equilibrations when chloride or nitrate ions, especially as $AlCl_3$ or $Al(NO_3)_3$ are added to the aqueous solutions.

See also: **10571** (ACS petroleum chemistry preprints); **10923** (Canadian chemical); **10926** (cost and profitability review); **10942** (liquid level measurement); **10968** (composition of coal bitumens); **11145** (Pb and refinery corrosion); **11332** (microscopic leak detection); **11368** (processing of nuclear fuels).

CHEMISTRY—ANALYTICAL

10475* (Russian.) Investigation of Indium Hydroxide Properties and Separation of Indium From Zinc. **Izuchenie svoistv gidrookisi indiia i otdelenie indiia ot tsinka.** E. N. Deichman. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 3, Mar., p. 257-265 + 1 plate.

Solubility of $In(OH)_3$ in 0.1 to 8 *M* NaOH solutions. The solubility in concentrated NaOH does not exceed 2×10^{-3} mol./l. Optimum methods of In and Zn analysis in the hydroxide form.

10476* The Rapid Determination of Carbon and Hydrogen in Highly Volatile Combustible Organic Liquids. A. R. Panicker and N. G. Banerjee. *Analyst*, v. 83, May 1958, p. 296-299.

Suitable for benzene, toluene, gasoline, and other petroleum distillates. A special weighing tube is described.

10477* (French.) Displacement Development on Ion Exchangers. The Case of the Separation of Two Ions. **Développement par déplacement sur échangeurs d'ions. Cas de la séparation de deux ions.** J. Coursier and J. Hure. *Analytica Chimica Acta*, v. 18, no. 4, Apr. 1958, p. 272-281.

Calculating the minimum distance that a band must travel to obtain a separation of the solutes in zones. Application to the separation of Na and K ions with Dowex-50 resin.

10478* (German.) Chloride Determination by Mercurimetry. **Mercurimetrie zur chloridbestimmung.** E. Dannenberg. *Analytica Chimica Acta*, v. 18, no. 4, Apr. 1958, p. 315-316.

Titration of chlorides with $Hg(NO_3)_2$ and diphenyl-carbazone is convenient, accurate, and economical.

10479* (English.) **Coulometric Determination of Chromium.** Louis Meites. *Analytica Chimica Acta*, v. 18, no. 4, Apr. 1958, p. 364-372.

Current-potential curves of Cr (III) and (II). Noninterfering and interfering elements. Determination in the presence of other elements.

10480 Automatic Computer Program for the Reduction of Routine Emission Spectrographic Data. Frank W. Anderson and James H. Moser. *Analytical Chemistry*, v. 30, May 1958, p. 879-881.

General-purpose, medium speed, digital computer program for the conversion of emisison spectrographic film line transmittances to element concentrations.

10481 High Temperature Gas Chromatography Apparatus. Stephen Dal Nogare and L. W. Safranski. *Analytical Chemistry*, v. 30, May 1958, p. 894-898.

The partition columns were operated in the range 150 to 350 C for the resolution of hydrocarbon, ester, and glycol mixtures. The Pt filament thermal-conductivity detectors were operated at 10 to 100 C higher.

10482 Photonometric Determination of Vanadium and Chromium. Clark E. Bricker and Stephen S. Schonberg. *Analytical Chemistry*, v. 30, May 1958, p. 922-928.

The number of photons or the time of exposure to a mercury vapor lamp is measured for determining Cr(VI) and/or vanadium(V). The photochemically sensitive solution of Fe(III) and oxalic acid containing the Cr and/or V is exposed to measured increments of radiation and the formation of Cr(III) or V(IV) is followed photometrically.

10483 Nonaqueous Titration of Zinc. Rapid Method for Zinc in Lubricating Oils. Thomas L. Marple, George Matsuyama, and Lorenzo W. Burdett. *Analytical Chemistry*, v. 30, May 1958, p. 937-940.

Rapid photometric titration method for Zn is based on its reactivity with diphenylthiocarbazone (dithizone) in a benzene-methanol medium.

10484 Spectrophotometric Studies of Chelates of 8-Quinolinol in Some Water-Miscible Organic Solvents. Photometric Titrations With 8-Quinolinol. Walter G. Boyle, Jr. and Rex J. Robinson. *Analytical Chemistry*, v. 30, May 1958, p. 958-961.

Titrations of Cu(II), Zn(II), Cd(II), Ni(II), Pb(II), and uranyl ion were investigated photometrically in dioxane-*n*-propyl alcohol and in dimethylformamide with 8-quinolinol as titrant.

10485 Quantitative Application of Sample Dispersion in Potassium Bromide for Infrared Analysis of Steroids. Harris Rosenkrantz, Paul Potvin, and Paul Skogstrom. *Analytical Chemistry*, v. 30, May 1958, p. 975-977.

The limitations of infrared analysis of steroid mixtures dispersed in HBr were studied using a rectangular die.

10486 Extraction of Chromium With Trioctylphosphine Oxide From Acidic Solutions of Alkali Metal Salts. Determination in Situ as Chromium-Diphenylcarbazide Complex. C. K. Mann and J. C. White. *Analytical Chemistry*, v. 30, May 1958, p. 989-992.

10487 Detection of Thorium and Uranium. James S. Fritz and Evelin Carlston Bradford. *Analytical Chemistry*, v. 30, June 1958, p. 1021-1022.

Simple qualitative tests for Th(IV) and U(VI) are proposed, based on color reactions with the reagent arsenazo.

10488 Gamma Spectrometric and Radiochemical Analysis for Impurities in Ultrapure Silicon. Barbara A. Thompson, Barbara M. Strause, and Maurice B. Leboeuf. *Analytical Chemistry*, v. 30, June 1958, p. 1023-1027.

Determination of specific elements is discussed and detection limits, in the part per billion range in most cases, are presented for some 29 elements by neutron activation analysis.

10489 Determination of Traces of Uranium With 1-(2-Pyridylazo)-2-naphthol. K. L. Cheng. *Analytical Chemistry*, v. 30, June 1958, p. 1027-1030.

10490 Determination of Total Fluoride Content in Uranium Tetrafluoride Using Ion Exchange Columns. K. F. Sporek. *Analytical Chemistry*, v. 30, June 1958, p. 1030-1032.

The solid sample of UF_4 is dissolved in a mixture of NaOH and H_2O_2 and after dilution the solution is passed through the ion exchange column.

10491 Redox Behavior of Cobalt Chelates of Nitrilotriacetic Acid. K. L. Cheng. *Analytical Chemistry*, v. 30, June 1958, p. 1035-1039.

Intensely colored complexes are formed by the oxidation of the (ethylenedinitrilo)tetraacetic acid (EDTA) or nitrilotriacetic acid (NTA) complexes of iron(III) and cobalt(II) with hydrogen peroxide in alkaline medium.

10492 Determination of Nitrogen Dioxide by Gas-Solid Chromatography. S. A. Greene and H. Pust. *Analytical Chemistry*, v. 30, June 1958, p. 1039-1040.

Nitrogen dioxide is rapidly converted to nitric oxide by the water absorbed on a Linde Molecular Sieve column. The resultant wave form is indistinguishable from that of pure nitric oxide introduced to the column.

10493 Coulometric Titrations With Mercury(I) and (II). Determination of Sulfide. Edwin P. Przybylowicz and L. B. Rogers. *Analytical Chemistry*, v. 30, June 1958, p. 1064-1069.

The coulometric determination of sulfide was undertaken because the extremely low solubility product reported for mercury (II) sulfide appeared to offer an excellent means for testing the ultimate sensitivity of coulometry.

10494 Determination of Small Amounts of Arsenic in Selenium. James F. Reed. *Analytical Chemistry*, v. 30, June 1958, p. 1122-1124.

Arsenic is determined by the Mo blue color method, but it is necessary to remove the Se quantitatively without loss of arsenic.

10495 Determination of Aromatic Nitro Compounds. W. B. Koniecki and A. L. Linch. *Analytical Chemistry*, v. 30, June 1958, p. 1134-1137.

Formamidine sulfinic acid (thiourea dioxide) under alkaline conditions reduced aromatic nitro compounds to satisfactory yields of primary aromatic amines in the concentration range of 5 to 50 mg. per liter. Diazotization and coupling of the aromatic amine to Chicago acid permitted quantitation as an azo dye by light transmittance measurement in the region of maximum absorption.

10496* (German.) Chemical Analysis by Neutron Reactions. **Chemische Analyse durch Neutronenreaktionen.** U. Schindewolf. *Angewandte Chemie*, v. 70, no. 7, Apr. 7, 1958, p. 181-187.

Assumptions and limits of neutron activation-analysis. Detection of extremely minute traces of matter by measuring the decay radiation or by determination of the decay products.

10497* (German.) Application of Infrared Spectroscopy in Determination of Mineral Content in Slags and Refractory Systems. **Anwendung der Ultrarot-Spektroskopie auf die Bestimmung der Mineralbestandteile in Schlacken und feuerfesten Systemen.** Werner Pepperhoff. *Archiv für das Eisenhüttenwesen*, v. 29, no. 3, Mar. 1958, p. 153-158.

10498* (German.) Photometric Determinations of Iron in Pure Tin and in Tin Melts for the Tinning of Steel Plates. **Photometrische Bestimmung des Eisens in Reinzinn und in Zinnschmelzen für die Verzinnung von Stahlblechen.** Heinrich Ploum. *Archiv für das Eisenhüttenwesen*, v. 29, no. 3, Mar. 1958, p. 169-172.

Thioglycolic acid was used to determine Fe in the presence of a large excess of Sn.

10499* A Colorimetric Method for Determining Low Concentrations of Mercaptans. George L. Ellman. *Archives of Biochemistry and Biophysics*, v. 74, no. 2, Apr. 1958, p. 443-450.

10500 A Method for Determining ^{24}Na and ^{42}K When Present Together in Liquid Samples. M. P. Esnouf. *British Journal of Applied Physics*, v. 9, Apr. 1958, p. 161-162.

A simple method based on the differential absorption of β-particles.

10501 Comparison of Wet With Spectroanalytical Methods for Total Aluminum in Steel. M. Lacomble and L. Dor. *Henry Brutcher Translation No.* 3810, 16 pp. (From *Revue Universelle des Mines*, v. 11, no. 2, 1955, p. 86-97.) Henry Brutcher, Altadena, Calif.

10502 Separation of Allylic Bromides Without Isomerization by Gas Chromatographic Techniques. R. F. Nystrom and C. R. A. Berger. *Chemistry & Industry*, 1958, no. 19, May 10, p. 559-560.

Results obtained with ^{14}C labeled allyl bromide.

10503* (French.) Carbon Determination in Steel by Means of Combustion and Conductivity Measurement. **Dosage du carbone dans les aciers par combustion et conductimétrie.** R. Boulin. *Chimie Analytique*, v. 40, no. 3, Mar. 1958, p. 72-76.

Applying an apparatus recording electrical conductivity measurements of a soda solution to the determination in four minutes of low C contents in ordinary steel and in six minutes in a stainless steel. Traces can be determined.

10504* (French.) Selective Microdetermination of Alkoxy Groups by Means of Gas-Liquid Chromatography. **Microdétermination sélective des groupes alcoxy par chromatographie gaz-liquide.** Vertalier and Martin. *Chimie Analytique*, v. 40, no. 3, Mar. 1958, p. 80-86.

When several alkoxy groups coexist in the same molecule, new methods of gas-liquid chromatography made possible a submicro method for the identification of these groups using samples of the order of 0.1 mg. Relationship between the methoxy and ethoxy groups in the same molecule; simultaneous determination up to 5-10%.

10505* (French.) Hertzian Orientation Spectra of Some Glycols. **Sur les spectres hertziens d'orientation de quelques glycols.** Claude Moriamez-Boullet. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 16, Apr. 21, 1958, p. 2364-2366.

The Hertzian orientation spectra of ethanediol, propanediol 1.2 and of pentanediol 1.5 were studied between −40 C and + 25 C and in the 0.1 frequency band at 25,000 MHz.

10506* (Czech.) Colorimetric Determination of Titanium in High-Alloyed Steels. **Kolorimetrické stanovení titanu ve vysocelegovaných ocelích.** M. Novotný. *Hutnické Listy*, v. 13, no. 5, May 1958, p. 430-431.

10507* Modern Spectrographic Analysis of Steel Works Materials. D. Manterfield. *Instrument Practice*, v. 12, Apr. 1958, p. 359-366.

Principles of spectrography; instruments; vacuum spectrography; analytical procedures.

10508 Ion Exchange Resins. Robert Kunin. 2nd Ed. 466 pp. 1958. John Wiley & Sons, New York. (QD553 K96i2)

The newer material includes such topics as permselective membranes, sugar refining, specific exchange resins, liquid in exchangers, catalysis, stability, and use of ion exchange resins in agriculture and atomic energy.

10509 The Determination of Arsenic in Iron and Steel. *Iron and Steel Institute, Journal*, v. 188, pt. 4, Apr. 1958, p. 331-337.

Colorimetric method for determination of As contents up to 0.03%. A standard method for determination of all As contents, based on reduction and precipitation of As with hypophosphite and titration with iodine.

10510* (Russian.) The Phase Analysis of Iron Ores. **Fazovyi analiz zheleznykh rud. III.** The Selective Dissolving of Magnetite in the Presence of Hematite. **Selektivnoe rastvorenie magnetita v prisutstvii gematita.** N. Kh. Pinchuk and Iu. V. Morachevskii. *Leningrad. Universitet. Vestnik*, v. 13, no. 4, 1958, p. 126-133.

10511 Composite Procedure for the Determination of Mo, Ni, Mn, Fe, Cr, Sn, V and N in Titanium Alloys. George Norwitz and Maurice Codell. *Metallurgia*, v. 57, May 1958, p. 261 + 8 pages.

A composite procedure.

10512* (Italian.) Determination of Automatic Coulometry of Chromium, Manganese, and Vanadium in Steel. **Determinazione coulombometrica automatica di cromo, manganese e vanadio negli acciai.** A. Liberti and L. Ciavatta. *Metallurgia Italiana*, v. 50, no. 2, Feb. 1958, p. 50-52.

Electrolytic reduction of Cr, Mn, and V from their maximum oxidation state. A 100% current efficiency is obtained using a ferric salt solution as electrolyte. The diffusion current, due to ferrous ion, stops the generating current automatically by means of an electronic relay.

10513* (English.) **Quantitative Microscopic Ionophoresis and Chromatography.** B. M. Turner. *Mikrochimica Acta*, 1958, no. 3, p. 305-318.

Gives a method a 100 millionfold or more as sensitive as paper strip techniques. Using mostly inorganic cation test mixtures, as little as $1.6\text{-}4.0 \cdot 10^{-8}$ pg ($1 \text{ pg} = 10^{-12}$ g) of each constituent can be quantitatively resolved in a 15-180 sec run.

10514* (English.) **The Anion-Exchange Separation of Tin and Antimony.** Joseph Dawson and Robert J. Magee. *Mikrochimica Acta*, 1958, no. 3, p. 325-329.

Malonic acid is used as eluant, the tin being held by the resin while the Sb passes rapidly through the column.

10515* (English.) **Preliminary Test for Nitrogen- and Oxygen-Containing Groups in Organic Compounds.** Fritz Feigl and Jefferson R. Amaral. *Mikrochimica Acta*, 1958, no. 3, p. 337-341.

Organic compounds carrying groups containing both N and O when they are heated by dry (pyrolysis) yield nitrous acid which is easily detected.

10516* (German.) A New Method of Uranium Concentration by Ion Exchange and Its Application to the Determination of Uranium in Solid Specimens. **Eine neue Methode zur Anreicherung des Urans mittels Ionenaustausches und deren Anwendung zur Bestimmung des Urans in festen Proben.** J. Korkisch, A. Farag, and F. Hecht. *Mikrochimica Acta*, 1958, no. 3, p. 415-425.

Separation of microgram as well as milligram quantities of U as a negatively charged ascorbate complex from a large number of cations and anions by means of the highly basic anion exchanger Amberlite I.R.A.-400 (ascorbate).

10517 Proceedings, Sixth Annual Conference on Industrial Applications of X-Ray Analysis, August 1957. William M. Mueller, editor. 494 pp. Denver Research Institute, University of Denver, Colorado. (QC481 C76p Over.)

A compilation of 31 papers discussing the latest developments in X-ray absorption, diffraction, and fluorescence analysis.

10518* Paper Chromatography as Applied to Refrigeration Sludge Analysis. G. D. Stevens and John D. Bopp. *Refrigerating Engineering*, v. 66, May 1958, p. 41-43.

A method for the qualitative analysis of foreign materials in refrigeration systems utilizing chromatographic techniques.

10519* The Determination of a Non-Ionic Detergent in Soap Mixtures. C. B. Stuffins. *Soap, Perfumery & Cosmetics*, v. 31, Apr. 1958, p. 369-370.

Method involves separation of the non-ionic detergent, formation of a phosphomolybdic acid complex, and subsequent gravimetric determination.

10520 Supplement No. 3 to Manual of the Analytical Methods Used by the Control Laboratory at the Chemical Processing Plant. John H. Sikes and James E. Rein. *U. S. Atomic Energy Commission, IDO*-14316 (Suppl. 3), Oct. 1957, 96 pp. (UF767 Un3.1id Contin.)

Thirteen new and modified methods for Zr, nitrates, Hg, fluoride, chloride, free acid, Ru, Ni, Cr, B, Al, and BOD.

10521 Chemical Analysis of Surfaces by Nuclear Methods. Sylvan Rubin, T. O. Passell, and L. E. Bailey. *U. S. Office of Technical Services, PB* 131298, Sept. 10, 1956, 29 pp. (T21 Un3r Contin.)

Nuclear scattering and nuclear reactions induced by high energy protons and deuterons are applied to the analysis of O, Al, Si, S, Ca, Fe, Cu, Ag, Ba, Pb, C, N, O, F, and Na.

10522* (Russian.) Determination of Co and Cd in High-Purity Nickel. **Opredelenie kobal'ta i kadmiia v nikele vysokoi chistoty.** S. E. Kreimer, N. V. Tuzhilina, V. A. Golovina, and R. A. Tiabina. *Zavodskaia Laboratoriia*, v. 24, no. 3, 1958, p. 262-264.

10523* (Russian.) The Calorimetric Method for Determining Copper in Nickel Electrolytes. **Kolorimetricheskii metod opredeleniia medi v nikelevykh elektrolitakh.** A. I. Busev, M. I. Ivaniutin, and E. M. Feigina. *Zavodskaia Laboratoriia*, v. 24, no. 3, 1958, p. 265-266.

10524* (Russian.) Amperometric Method of Determining Ozone Concentration in a Gas Flow. **Amperometricheskii metod opredeleniia kontsentratsii ozona v gazovom potoke.** E. V. Kasatkin. *Zavodskaia Laboratoriia*, v. 24, no. 4, 1958, p. 407-409.

10525* (Russian.) Determination of Carbon in Chrome-Nickel Steels by Spectral Analysis. **Opredelenie ugleroda v khromonikelevykh staliakh spektral'nym metodom.** E. S. Kudelia. *Zavodskaia Laboratoriia*, v. 24, no. 4, 1958, p. 458.

10526* (Russian.) Spectroscopic Method of Determination of Nickel in Cobalt Compounds and Co-Ni Compounds. **Spektral'nyi metod opredeleniia nikelia v soedineniiakh kobal'ta i kobal'ta v soedineniiakh nikelia.** G. Ia. Fateeva. *Zavodskaia Laboratoriia*, v. 24, no. 4, 1958, p. 461.

10527* (German.) Additional Information on the Infrared Absorption Spectra of Various Phosphorus Compounds. **Beiträge zur Kenntnis der Ultrarot-Absorptionsspektren verschiedener Phosphorverbindungen. II.** Alkalidiphosphates. **Alkalidiphosphate.** A. Mutschin and K. Maennchen. *Zeitschrift für Analytische Chemie*, v. 160, no. 2, 1958, p. 81-98.

Infrared absorption spectrograms of diphosphoric acid, its sodium salts, and tetrapotassium diphosphate were plotted for NaCl, KBr, and CsBr ranges.

10528* (English.) **Sodium Alizarin-3-Sulphonate as a Colorimetric Reagent for the Micro-Determination of Uranium.** Anil K. Mukherji and Arun K. Dey. *Zeitschrift für Analytische Chemie*, v. 160, no. 2, 1958, p. 98-104.

Reagent is sensitive to 10 ppm. of U.

10529* (German.) Statistics in Chemical Analysis. **Statistik in der chemischen Analyse. II.** The Evaluation of Practical Analyses. **Die Bewertung praktischer Analysen.** G. Gottschalk and P. Dehmel. *Zeitschrift für Analytische Chemie*, v. 160, no. 3, 1958, p. 161-169.

10530* (English.) **Gravimetric Determination of Silver as Silver Chromate.** G. P. Pendse, H. D. Bhargava, and B. R. Sant. *Zeitschrift für Analytische Chemie*, v. 160, no. 3, 1958, p. 188-189.

10531* (English.) **A New Volumetric Method for the Determination of Uranium(VI). Photochemical Reduction With Ether.** V. Panduranga Rao and G. Gopala Rao. *Zeitschrift für Analytische Chemie*, v. 160, no. 3, 1958, p. 190-193.

Method based on photoreduction in the presence of diethyl ether and titration with sodium vanadate.

10532* (English.) **Potentiometric Determination of Lead.** Ram Sahai Saxena. *Zeitschrift für Analytische Chemie*, v. 160, no. 3, 1958, p. 194-197.

The reaction between $Pb(NO_3)_2$ and $K_4Fe(CN)_6$ was studied potentiometrically using ferricyanide-ferrocyanide electrode. A pronounced maxima in dE/dC is obtained at the end point corresponding to the formation and precipitation of $Pb_2Fe(CN)_6$.

10533* (German.) The Determination of Phosphorus and Arsenic in Unalloyed Steel by Volumetric Analysis According to the Differential Method With Quinoline Ammonium Molybdate. **Massanalytische Bestimmung von Phosphor und Arsen in unlegiertem Stahl nach dem Differenzverfahren mit Chinolinammoniummolybdat.** S. Meyer and O. G. Koch. *Zeitschrift für Analytische Chemie*, v. 160, no. 4, 1958, p. 253-258.

As low as 0.001% P and As can be determined with an average error of ± 0.0002% for P and 0.0005% for As.

10534* (English.) **Alkaline Bromine as Volumetric Reagent, Analytical Applications. I. Estimation of Ammonia, Urea and Thiourea. II. Estimation of Isopropyl Alcohol and Acetone Singly as Well as in Mixture.** K. C. Grover and R. C. Mehrotra. *Zeitschrift für Analytische Chemie*, v. 160, no. 4, 1958, p. 267-276.

10535* (German.) Spectrochemical Analysis of the Electron Tube-Cathode Nickel Alloys. **Spektrochemische Analyse der Elektronenröhren - Kathodennickellegierungen.** L. Vecsernyés. *Zeitschrift für Analytische Chemie*, v. 160, no. 5, 1958, p. 332-335.

Zinc, Pb, Al, Mg, Mn, Fe, Cu, Cr, and Co in cathode Ni can be determined within the range of 0.001 to 1.0%.

10536* (English.) **A Rapid Method for the Separation of Tantalum From Niobium and of the Mixed Oxides From Zirconia.** B. S. Krishna Rao, D. V. N. Sarma, and Bh. S. V. Raghava Rao. *Zeitschrift für Analytische Chemie*, v. 160, no. 5, 1958, p. 351-353.

Method based on the differences in solubility of the morinates of Ta and Nb in acetone and alcohol.

10537* (English.) **Conductometric Studies on the Composition of Mercuric Ferricyanide Complex.** Ram Sahai Saxena. *Zeitschrift für Analytische Chemie*, v. 160, no. 5, 1958, p. 353-358.

Studies involved conductometric titrations between $Hg(NO_3)_2$ and $K_3Fe(CN)_6$ at several concentrations, both by direct and inverse methods.

10538* (German.) The Application of Vapor Phase Analysis to the Evaluation of Very Small Quantities of Material. **Die Verwendung der Verdampfungsanalyse zur Erfassung geringster Stoffmengen. I.** Method of Operation. **Das Arbeitsverfahren.** W. Geilmann. *Zeitschrift für Analytische Chemie*, v. 160, no. 6, 1958, p. 410-426.

Determining easily volatile elements by separation through evaporation in the gas current and determination in the condensated sublimate deposited on a special electrode. Identification of nanograms.

10539* (German.) A Contribution to the Separation of Uranium From Thorium by Ion Exchange and to the Fluorimetric Determination of Uranium. **Beitrag zur Trennung des Urans von Thorium mittels Ionenaustausches und zur fluorimetrischen Uranbestimmung.** Ernst Tomic, Inge-Maria Ladenbauer, and Maria Pollak. *Zeitschrift für Analytische Chemie*, v. 161, no. 1, 1958, p. 28-38.

Separating U from Th by means of the strongly basic anion exchanger Amberlite IRA 400. U(VI) can be separated from Th and from a series of other cations, because it forms a negatively charged complex with 6.5 n hydrochloric acid Th does not form any complex and is not absorbed.

10540* (Russian.) Determination of Small Quantities of Indium by Titrometry and Photometry. **Opredelenie malykh kolichestv indiia titrimetricheskim i fotometricheskim metodom.** E. N. Deichman and I. V. Tananaev. *Zhurnal Analiticheskoi Khimii*, v. 13, no. 2, Mar.-Apr. 1958, p. 196-200.

Using $Na_4[Fe(CN)_6]$ for volumetric and $K_3[Fe(CN)_6]$ for photometric method with diphenyl amine as indicator.

10541* (Russian.) Separation of Thorium From the Rare Earth Elements by Means of Pyridine and Its Nitrate. **Otdelenie toriia ot redkozemel'nykh elementov pri pomoshchi piridina i ego azotnokisloi soli.** E. A. Ostroumov. *Zhurnal Analiticheskoi Khimii*, v. 13, no. 2, Mar.-Apr. 1958, p. 201-205.

Quantitative precipitation of Th in the presence of ammonium nitrate at pH 4.1 to 4.2.

10542* (Russian.) Analytical Application of Phenol-Carbonic Acids of the Triphenylmethane Series. Determination of Vanadium in Steels With Use of Aluminon. **Analiticheskoe primenenie fenolkarbonovykh kislot trifenilmetanovogo riada. Opredelenie vanadiia v staliakh pri pomoshchi aliuminona.** I. S. Mustafin and E. A. Kashkovskia. *Zhurnal Analiticheskoi Khimii*, v. 13, no. 2, Mar.-Apr. 1958, p. 215-219.

Photocolorimetric method without separating interfering ions applicable for certain grades of steel.

10543* (Russian.) Complex Compounds of Iridium and Rhodium With Thiourea, and Their Utilization in Separation and Determination of These Metals. **Kompleksnye soedineniia iridiia i rodiia s tiomochevinoi i ikh primenenie k bydeleniiu i opredeleniiu etikh metallov.** N. K. Pshenitsyn and I. V. Prokof'eva. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 4, Apr. 1958, p. 996-1001.

10544* (Russian.) Polarographic Behavior of Germanium on a Mercury Drop Electrode. **Poliarograficheskoe povedenie germaniia na rtutnom kapel'nom elektrode.** M. N. Platonova. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 4, Apr. 1958, p. 1002-1007.

10545* (Russian.) The Separation of Niobium and Titanium Using the Ion-Exchange Method. **Razdelenie niobiia i titana metodom ionnogo obmena.** O. V. Al'tshuler, E. A. Subbotina, and A. F. Afanas'eva. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 5, May 1958, p. 1192-1199.

See also: **10647** (ion-exchange on the surface of oxidized carbon); **10659** (ion-exchange studies); **10678** (ion-exchange resins); **10691** (spectrum analysis of Mo); **10716** (separation of Li from other alkali metals); **10772** (punched card analytical lab control).

CHEMISTRY—INORGANIC AND GENERAL

10546 Fluorine Chemistry Developments. IV. Peroxytrifluoroacetic Acid as Oxidiser. W. K. R. Musgrave. *Chemical Age*, v. 79, May 10, 1958, p. 878.

10547 Peroxides of Elements Other Than Carbon. I. The Preparation and Reactions of Peroxysilanes. E. Buncel and Alwyn G. Davies. *Chemical Society, Journal*, 1958, Apr., p. 1550-1556.

10548 Addition Compounds of Gallium Trichloride. V. Ionic 1 : 1 and 1 : 2 Complexes With Pyridine. VI. Complexes With Piperidine. N. N. Greenwood and K. Wade. *Chemical Society, Journal*, 1958, Apr., p. 1663-1679.

10549* (German.) The Chemistry of High-Molecular Inorganic Compounds, Particularly That of Phosphates and Silicates. **Die Chemie hochmolekularer anorganischer Verbindungen, im besonderen der Phosphate und Silikate.** Erich Thilo. *Chemische Technik*, v. 10, no. 2, Feb. 1958, p. 70-74.

10550* (Italian.) Radical Reaction of Nitrous Oxide: Nitrous Oxides From NO and Peroxides. **Reazioni radicaliche dell'ossido d'azoto: acidi azotati da NO e perossidi.** Gian Paolo Chiusoli and Francesco Minisci. *Gazzetta Chimica Italiana*, v. 88, no. 3, Mar. 1958, p. 261-270.

A study of the reactions of nitrous oxide with radicals produced by the decomposition of peroxides. Effects on the grignard reagents. Description of products obtained from the decomposition of the cyclohexanone.

10551 Infra-Red Spectra of Inorganic Solids. III. Octacyano Complexes of Tungsten(IV), (V), and Molybdenum (IV), (V), Dihydrate and Anhydrous. Edward G. Brame, Jr., Frederic A. Johnson, Edwin M. Larsen, and Villiers W. Meloche. *Journal of Inorganic and Nuclear Chemistry*, v. 6, no. 2, Apr. 1958, p. 99-103.

10552 Kinetics of Oxidation Reduction Reactions of Plutonium. The Reaction Between Plutonium (VI) and Plutonium (III) in Perchlorate Solution. Sherman W. Rabideau and Robert J. Kline. *Journal of Physical Chemistry*, v. 62, May 1958, p. 617-620.

10553 Molecules and Crystals in Inorganic Chemistry. A. E. Van Arkel. 2nd Ed. 270 pp. 1956. Butterworths Scientific Publications, London. (QD469 A48m3)

The chemical bond; the ionic bond. Properties of ionic compounds; chemical reactions; complex compounds; polarization; water as a component of compounds and solutions; non-electrostatic bonds.

10554* (German.) Application of Sodium Chloride as an Alkaline Component in Glass Batches. **Kochsalz als Alkalikomponente in Glasgemengen.** Eduard Eipeltauer. *Silikattechnik*, v. 9, no. 3, Mar. 1958, p. 99-105.

10555 (English, French, and German.) **XVIth International Congress of Pure and Applied Chemistry, Paris, July 1957.** 354 pp. Birkhauser Verlag, Basel, Switzerland. (QD1 In8p)

Eighteen conference papers.

10556 Studies Relating to the Structure of Aluminum Hydride. Robert F. Nickerson. *U. S. Atomic Energy Commission, UCRL*-8089, Dec. 16, 1957, 93 pp. (UF767 U3u Contin.)

Describes unsuccessful attempts to prepare ether-free AlH_3, nuclear spin resonance studies of solid AlH_3, and high-resolution nuclear spin resonance studies of the reaction $3LiAlH_4 + AlCl_3 \rightarrow 3LiCl + 4AlH_3$.

10557 Preparation and Purification of Indium Arsenide. Dorothy P. Enright. *U. S. Department of the Navy, Bureau of Ordnance, NAVORD Report* 6024, Jan. 15, 1958, 42 pp. (TL570 Un3.55n Contin.)

Indium arsenide was prepared by the single furnace method and the two furnace method. Electrical, optical, and some physical and chemical properties of InAs are presented.

10558* (English.) **The Nature of a *Cu-Ni* Catalyst From Its Reaction With Hydrogen Chloride.** Toyosaburo Takeuchi, Fusae Shibata, and Masakazu Sakaguchi. *Zeitschrift für Physikalische Chemie* (Neue Folge), v. 14, nos. 5/6, Mar. 1958, p. 339-344.

The reaction between HCl gas and a Cu-Ni catalyst (12% Ni) prepared from Cu and Ni nitrates was carried out at 150 C, and the amounts of Cu and Ni ions produced were measured by a polarographic method.

10559* (Russian.) Solubility of Thallium and Cesium Nitrocobaltates. **Rastvorimost' nitrokobal'tiatov talliia i tseziia.** I. M. Korenman, F. R. Sheianova, T. N. Vishnevskaia, and B. I. Bratanov. *Zhurnal Neorganicheskoĭ Khimii*, v. 3, no. 5, May 1958, p. 1188-1191.

See also: **10603** (antioxidants); **10637** (investigation of the hydrogen-bond by infrared absorption spectra); **10650** (rhodium coordination compounds); **10714** (reduction of uranium oxides with hydrogen).

CHEMISTRY—ORGANIC

10560* (Russian.) Synthesis of Silicon Olefin Oxides From Chlorhydrins. **Sintez okisei kremneolefinov iz khlorgidrinov.** S. I. Sadykh-Zade, A. D. Petrov, and L. V. Nozdrina. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 4, Feb. 1, 1958, p. 723-726.

Reaction between Grignard reagents and silicon halides, with yield of 80 to 90%.

10561* (Russian.) The Synthesis and Properties of Mixed Phenylimidodithiocarbonic Esters. **Sintez i svoistva smeshannykh efirov fenilimidoditiougol'noi kisloty.** A. I. Mashentsev. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 1, Mar. 1, 1958, p. 94-97.

10562* (Russian.) The Equilibrium of Condensed Phases in the Naphthalene-Thionaphtene System. **Ravnovesie kondensirovannykh faz v sisteme naftalin-tionaften.** V. M. Kravchenko and I. S. Pastukhova. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 285-287.

10563* (Russian.) Interaction Between Vinyl Acetylene and Diazomethane. **Vzaimodeistvie vinilatsetilena s diazometanom.** A. T. Troshchenko and A. A. Petrov. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 292-293.

10564* (Russian.) Reactions of Fluorolefins. **Reaktsii ftorolefinov. VII.** Addition of Acid Chlorides to Vinylidene Fluoride and Trifluorethylene. **Prisoedinenie khlorangidridov kislot k ftoristomu vinilidenu i triftoretilenu.** I. L. Knuniants, R. N. Sterlin, L. N. Pinkina, and B. L. Diatkin. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 3, Mar., p. 296-299.

The following compounds were obtained: methyl-2-chloro-2,2-difluoroethyl ketone, ethyl-2 - chloro - 2,2 - difluoroethyl ketone, propyl-2-chloro-2,2-difluoroethyl ketone, and methyl-2-chloro-1,2,2,-trifluoroethyl ketone.

10565* (Russian.) Fluoroolefine Reactions. **Reaktsii ftorolefinov. II.** Obtaining and Some Properties of 2-Perfluoropropylene Iodide. **Poluchenie i nekotorye svoistva 2-iodperftorpropilena.** I. L. Knuniants, R. N. Sterlin, and V. E. Bogachev. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 4, Apr., p. 425-427.

10566* (Russian.) Isomerization of Saturated Hydrocarbons. **Izomerizatsiia nasyshchennykh uglevodorodov. I.** Isomeric Conversion of Alkanes With C_6—C_8 Composition. **Izomernye prevrashcheniia alkanov sostava C_6—C_8.** A. A. Petrov, et al. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 4, Apr., p. 437-445.

A systematic experimental investigation of the isomerization reaction of alkanes with C_6—C_8 composition under hydrogen pressure and comparison of obtained experimental data with calculated thermodynamic values. A series of new facts on connection between structure and reactivity of hydrocarbons.

10567* (Russian.) Heterocyclic Compounds. **Geterotsiklicheskie soedineniia. LVIII.** Synthetic Anaesthetic Substances. **Sinteticheskie obezbolivaiushchie veshchestva. Pt. XIX.** Synthesis of Benzoic and Phenylacetic Esters of 1-Alkenyl-2,5-dimethyl-4-ethylyn-4-piperidols. **Sintez benzoinykh i fenoksiuksusnykh efirov 1-alkenil-2,5-dimetil-4-etinil-4-piperidolov.** I. N. Nazarov and A. Sh. Sharifkanov. *Akademiia Nauk SSSR, Izvestiia Otdelenie Khimicheskikh Nauk*, 1958, no. 4, Apr., p. 446-451.

10568* (Russian.) Acetylene Derivatives. **Proizvodnye atsetilena. CLXXXI.** Hydration of Vinyl-Acetylenic Amines Into Unsaturated β-Aminoketones. **Gidratatsiia vinilatsetilenovykh aminov v nepredel'nye β-aminoketony.** I. N. Nazarov and E. A. Mistriukov. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 4, Apr., p. 460-464.

Determining conditions of hydration of vinyl-acetylenic amines, and synthesis of a series of unsaturated β-aminoketones, which are of interest for synthesis of γ-piperidines and some physiological active compounds, in particular of anaesthetic substances.

10569* (Russian.) Acetylene Derivatives. **Proizvodnye atsetilena. CLXXXII.** A New Method for the Synthesis of Divinylketones by Cleavage of Alkenyl-β-Dimethylmethylaminoethylketone Iodides. **Novyi metod sinteza divinilketonov rasshchepleniem iodmetilatov alkenil-β-dietilaminoetilketonov.** I. N. Nazarov and E. A. Mistriukov. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 4, Apr., p. 465-468.

Development of a method for synthesis of alkenylvinylketones by pyrolysis of alkenyl-β-dialkylaminoethylketone iodomethylates obtained from vinyl-acetylenic hydrocarbons. Described alkenylvinylketones (divinylketones) are favorable initial products for obtaining γ-piperidines, which are of interest for the synthesis of high-active analgesics.

10570* (Russian.) Synthesis of Polyarylene-Alkyls. **Sintez poliarilenalkilov. IV.** Effect of Temperature on the Development of Copolycondensation of Benzene and Chlorobenzene With Ethylene Dichloride. **Vliianie temperatury na techenie sovmestnoi polikondensatsii benzola i khlorbenzola s dikhloretanom.** G. S. Kolesnikov, V. V. Korshak, and A. P. Suprun. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 4, Apr., p. 492-497.

10571 *American Chemical Society, Division of Petroleum Chemistry, General Papers, Preprints*, v. 3, no. 1, Mar. 1958, 331 pp. (TP690 Am35g Vis.)

A collection of 38 papers on various aspects of petroleum chemistry.

10572 Boroxines. I. Alkyl Derivatives. John C. Perrine and R. N. Keller. *American Chemical Society, Journal*, v. 80, Apr. 20, 1958, p. 1823-1827.

The properties of tri-*n*-butylboroxine, in particular, were examined.

10573 The Reaction of Enolic β-Ketoesters and β-Diketones With Phenylmagnesium Bromide. Jeremiah P. Freeman. *American Chemical Society, Journal*, v. 80, Apr. 20, 1958, p. 1926-1930.

Effects of structure of the carbonyl compound on composition of the product.

10574 Reactions of Diolefins at High Temperatures. I. Kinetics of the Cyclization of 3,7-Dimethyl-1,6-Octadiene. William D. Huntsman and Thomas H. Curry. *American Chemical Society, Journal*, v. 80, May 5, 1958, p. 2252-2254.

Cyclization at 382.5 and 409 C is first-order, and the rate is not affected by the presence of nitric oxide or ethylene oxide.

10575 Condensed Cyclobutane Aromatic Systems. IV. Benzocyclobutene and 1-Bromobenzocyclobutene. M. P. Cava and D. R. Napier. *American Chemical Society, Journal*, v. 80, May 5, 1958, p. 2255-2257.

A hitherto unknown benzocyclobutene was obtained.

10576 The Inductive Effects of Alkyl Groups as Determined by Desilylation Reactions. Robert A. Benkeser, Richard A. Hickner, and Donald I. Hoke. *American Chemical Society, Journal*, v. 80, May 5, 1958, p. 2279-2282.

10577 Kinetics of the Friedel-Crafts Benzoylation of Benzene With Aluminum Chloride as Catalyst and Benzoyl Chloride as Solvent. Herbert C. Brown and Frederick R. Jensen. *American Chemical Society, Journal*, v. 80, May 5, 1958, p. 2291-2296.

In benzoyl chloride as solvent, $AlCl_3$ brings about the quantitative benzoylation of benzene. The reaction exhibits simple second-order kinetics, first order in $AlCl_3$, and first order in benzene.

10578 The Reaction of Mercaptoacetic Acid With Methyl Linoleate and Linoleic Acid. Sara P. Fore, Robert T. O'Connor, and Leo A. Goldblatt. *American Oil Chemists' Society, Journal*, v. 35, May 1958, p. 225-230.

The reaction proceeded at low and erratic rates, with and without catalysts, such as peroxides at various temperatures, but could be accelerated by use of a large excess of mercaptoacetic acid.

10579 Observations on the Permanganate Oxidation of Unsaturated Esters. L. R. Eshelman and Earl G. Hammond. *American Oil Chemists' Society, Journal*, v. 35, May 1958, p. 230-233.

All the procedures tested except Kartha's procedure caused considerable loss of ester groups. Kartha's procedure, however, caused ester groups to be synthesized during the oxidation.

10580 Reactions of Conjugated Fatty Acids. VI. Selenium Catalysis, a Method for Preparing Diels-Alder Adducts From Cis, Trans-Octadecadienoic Acid. H. M. Teeter, et al. *American Oil Chemists' Society, Journal*, v. 35, May 1958, p. 238-240.

10581* Progress in Perfumery Materials. I. Paul Z. Bedoukian. *American Perfumer and Aromatics*, v. 71, Apr. 1958, p. 42-46.

The nature of odor and its perception; work which may lead to synthetic aliphatic terpenes; analytical procedures; research in ionones and musk compounds.

10582* (German.) Silanes. **Über Silane.** H. Clasen. *Angewandte Chemie*, v. 70, no. 7, Apr. 7, 1958, p. 179-180.

Obtaining SiH_4 without danger by reacting Mg_2Si with NH_4Cl in boiling NH_3 at room temperature. Preparing $(C_2H_5)_2SiH_2$ by high pressure addition of ethylene to SiH_4. Behavior of these silanes in hydrolysis and oxidation processes.

10583* (French.) A Contribution to the Study of Allene and Acetylene Monoketones and Diketones. **Contribution a l'étude des monocétones et dicétones alléniques et acétyléniques.** Françoise Gaudemar-Bardone. *Annales de Chimie*, v. 3, Jan.-Feb. 1958, p. 52-107.

A study of addition, on α-α'diacetylenic ketones, of reagents having two mobile hydrogens on the same atom, thus opening a new way towards heterocycles. Dibenzoyl-allene. A new class: α-allene ketones.

10584* (English.) **3-Substituted Thiophenes. Preparation and Metalation of 3-Methoxythiophene.** Salo Gronowitz. *Arkiv för Kemi*, v. 12, no. 3, 1958, p. 239-246.

3-Methoxythiophene has been prepared. It is metalated by *n*-butyl lithium in the 2-position.

10585 Cyclisations With Hydrazine. I. The Preparation of Phenanthrene Compounds and of Pyrene From Aldehydes. A Variation in Reductions of the Wolff-Kishner Type. II. Conversion of 2:2'-Diacyldiphenyls Into Compounds of the Phenanthrene and 4:5-6:7-Dibenzo-1:2-diazocine Series. R. G. R. Bacon and W. S. Lindsay. *Chemical Society, Journal*, 1958, Apr., p. 1375-1389.

10586* Reduction by Metal-Amine Solutions: Applications in Synthesis and Determination of Structure. A. J. Birch and Herchel Smith. *Chemical Society, Quarterly Reviews*, v. 12, no. 1, 1958, p. 17-33.

10587* (Czech.) The Alkylation of Ethyl Methylene-bis-Malonate. **Alkylace methylen-bis-malonanu ethylnatého.** Rudolf Lukeš, Věra Heřmánková, and Stanislav Heřmánek. *Chemické Listy*, v. 52, no. 4, Apr. 1958, p. 682-687.

Newly modified alkylation of ethyl methylene-bis-malonate by low and intermediate alkylhalides. The effect of sodium ethylate on ethyl monoalkylmethylene-bis-malonate causes cleavage of the bond between carbons. This proves formation of by-products in Dressel method alkylation.

10588* (Czech.) The Mechanism of Alkaline Polymerization of Caprolactam. **K mechanismu alkalické polymerisace 6-kaprolaktamu.** Jan Šebenda and Jaroslav Králiček. *Chemické Listy*, v. 52, no. 4, Apr. 1958, p. 758-759.

Polymerization of caprolactam in presence of 0.01 mol. Na-caprolactam and 0.01 mol. imide for 1 mol. caprolactam for 30 min. at 100 C.

10589* (German.) Pyridine Derivatives. **Über Pyridinabkömmlinge. II.** Benzidine-Like Rearrangements Within the Pyridine Series. **Benzidinartige Umlagerungen in der Pyridinreihe.** Hans Beyer, Hans-Joachim Haase, and Wolfgang Wildgrube. *Chemische Berichte*, v. 91, no. 2, 1958, p. 247-256.

10590* (German.) Amino Alcohols. **Aminoalkohole. I.** *cis-* and *trans*-DL-1-Amino-2-hydroxytetralin, and *cis-* and *trans*-DL-1-Amino-2-hydroxyindane. ***cis-* und *trans*-DL-1-Amino-2-hydroxy-tetralin und *cis-* und *trans*-DL-1-Amino-2-hydroxy-indan. II.** Hydroxyamino Compounds of the Cholestane Series. **Hydroxy-amino-Verbindungen der Cholestanreihe. III.** Nor-12-oleanenol-17-amine and 12-Oleanenol-28-amine. **Nor-olea-12-enol-17-amin und Olea-12-enol-28-amin. IV.** Report on the New Synthesis of DL-*Threo*-1-hydroxy-1-phenyl-2-aminopropane. **Notiz über eine neue Synthese des DL-*threo*-1-Hydroxy-1-phenyl-2-amino-propans. V.** Stereochemical Coordination of Aminocyclopentanols Through the Formation of Complexes. **Stereochemische Zuordnung von Aminocyclopentanolen durch Komplexbildung.** Guenther Drefahl, et. al. *Chemische Berichte*, v. 91, no. 2, 1958, p. 266-286.

10591* (German.) Condensations of Trichloroacrolein With Active Methylene Compounds. **Kondensationen von Trichloracrolein mit aktiven Methylenverbindungen.** Alfred Roedig

and Siegfried Schödel. *Chemische Berichte*, v. 91, no. 2, 1958, p. 320-329.

10592* (German.) 3-Chloro-5-oxo-5,6,7,8-tetrahydrocoumarin From Trichloroacrolein and Dihydroresorcinol. **3-Chlor-5-oxo-5.6.7.8-tetrahydro-cumarin aus Trichloracrolein und Dihydroresorcin.** Alfred Roedig and Siegfried Schödel. *Chemische Berichte*, v. 91, no. 2, 1958, p. 330-339.

10593* (German.) The Orcein Dyes. **Uber Orceinfarbstoffe. VII.** The Synthesis, Constitution, and Light Absorption of Henrich's Quinone. **Synthese, Konstitution und Lichtabsorption des Henrichschen Chinons.** Hans Musso. *Chemische Berichte*, v. 91, no. 2, 1958, p. 349-363.

10594* (German.) Effects of Lithium Aluminum Hydride on Carbohydrates. **Über die Einwirkung von Lithiumaluminiumhydrid auf Kohlenhydrate.** Horst Endres and Manfred Oppelt. *Chemische Berichte*, v. 91, no. 3, 1958, p. 478-482.

Cyclic semi-acetals and acetals are not reduced by $LiAlH_4$ in contrast with aldehyde sugars. The reducibility of sugars and sugar derivatives runs parallel to the rate of their mutarotation.

10595* (German.) Alkylations With Isoprene Dibromide. **Alkylierungen mit Isoprendibromid.** Josef Nickl. *Chemische Berichte*, v. 91, no. 3, 1958, p. 553-565.

Isoprene dibromide reacts with Na salts of malonic esters and cyanic acetic esters by forming 2-isopropenyl-cyclopropane derivatives. With enolyzable cyclic β-diketo-systems, 2-isopropenyldihydrofuran derivatives are produced.

10596* (German.) The Structure of Osazones. **Über die Struktur der Osazone.** G. Henseke and Hans-Joachim Binte. *Chimia*, v. 12, no. 4, Apr. 1958, p. 103-112.

10597* (Italian.) Kinetics of Propylene Polymerization With Highly Stereospecific Heterogeneous Catalysts. **Cinetica della polimerizzazione del propilene con catalizzatori eterogenei ad elevata stereospecificità. V.** Study of Chain Transfer Processes With C^{14} Labelled Aluminum Alkyls. **Studio dei processi di trasferimento di catena con l'impiego di alluminio-alchili segnati con C^{14}.** G. Natta, I. Pasquon, E. Giachetti, and G. Pajaro. *Chimica e l'Industria*, v. 40, no. 4, Apr. 1958, p. 267-273.

In propylene polymerization, in the presence of the catalytic system $TiCl_3$ (violet form)-$Al(C_2H_5)_3$-n-heptane, part of the growing chains rupture processes results in the introduction of C_2H_5 groups from $Al(C_2H_5)_3$ in the polymer.

10598* (French.) Chlorotetrolic Acid. **Sur l'acide chlorotétrolique.** Martin Olomucki. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 12, Mar. 24, 1958, p. 1877-1879.

The principal product of chromic oxidation of 4-chloro-2-butyn-1-ol was chlorotetrolic acid. The methyl and ethyl esters and ethyl iodotetrolate were prepared.

10599* (Italian.) Nitrile Oxides and β Chlorovinyl Ketones. **Nitrilossidi e β clorovinilchetoni. XIV.** Nitrile Oxides. **Sugli ossidi di nitrili.** Paolo Grünanger and Sergio Mangiapan. *Gazzetta Chimica Italiana*, v. 88, no. 2, Feb. 1958, p. 149-160.

A study of the reaction capacity of the nitrile oxide R-C≡N→O with β-chlorovinyl ketones, R'-CO-CH=CHCl. α-Isoxazolic ketones were obtained by elimination of the HCl.

10600* (Italian.) Stereospecific Polymerization of α-Olefins. **Polimerizzazione stereospecifica delle α-olefine. IV.** Polymerization of Propylene With Different Titanium Chlorides and Trialkyl-Aluminum. **Polimerizzazione del propilene con cloruri di titanio e alluminio trialchili diversi.** Guilio Natta, Piero Pino, Giorgio Mazzanti, and Paolo Longi. *Gazzetta Chimica Italiana*, v. 88, no. 2, Feb. 1958, p. 219-228.

Variations in the rate of polymerization and the stereoisomeric composition of the polymers obtained. Decrease of stereospecificity with increase of the number of C atoms of the Al alkyls. Variation of the mol. wt. of the isotactic polymer.

10601 Preparation and Properties of the Alkylene Carbonates. W. J. Peppel. *Industrial and Engineering Chemistry*, v. 50, May 1958, p. 767-770.

Preparation from the corresponding 1,2-epoxides and CO_2 using quaternary ammonium halides.

10602 Oxidation of *tert*-Butylcyclohexane to Dibasic Acids With Nitrogen Dioxide. William H. Clingman, Jr. and Francis T. Wadsworth. *Industrial and Engineering Chemistry*, v. 50, May 1958, p. 777-780.

Best results are obtained at superatmospheric pressure of O in presence of acetic-sulfuric acid mixtures.

10603 Sulfur Compounds as Antioxidants. R. B. Thompson, J. A. Chenicek, and Ted Symon. *Industrial and Engineering Chemistry*, v. 50, May 1958, p. 797-798.

Alkylmercapto amides, sulfoxides, sulfones, and 1,2-bisalkylsulfinylethane were found to be antioxidants. Some additional variations of the molecule were studied with respect to their effect on potency.

10604* (French.) Recent Studies of the Oxidation of Oils. **Etudes récentes sur l'oxydation des Huiles.** Pierre de Radzitzky. *Industrie Chimique Belge*, v. 23, no. 3, Mar. 1958, p. 233-250.

Autoxidation theory applied to hydrocarbons. Survey, advantages, and disadvantages of the principal methods of study. Isolating the constituents of oils. Corrosion. Oxidation of synthetic oils.

10605 Some Dehalogenation Reactions of 1,4-Dibromobutane. William B. Smith. *Journal of Organic Chemistry*, v. 23, Apr. 1958, p. 509-512.

Reaction leads to a mixture of ethylene, butane, 1-butene, *trans* and *cis* 2-butenes, 1,3-butadiene, and cyclobutane.

10606 Synthesis of Heterocyclic Compounds From Aryl Azides. IV. Benzo-, Methoxy-, and Chloro-Carbazoles. Peter A. S. Smith, John M. Clegg, and J. H. Hall. *Journal of Organic Chemistry*, v. 23, Apr. 1958, p. 524-529.

10607 Preparation of Vinylphenols and Isopropenylphenols. B. B. Corson, et al. *Journal of Organic Chemistry*, v. 23, Apr. 1958, p. 544-549.

Reports the preparation of five alkenylphenols.

10608 Syntheses and Ultraviolet Absorption Spectra of Certain Sulfur-Containing Derivatives of Naphthalene. Arthur H. Weinstein and Robert M. Pierson. *Journal of Organic Chemistry*, v. 23, Apr. 1958, p. 554-560.

Certain mercaptans, sulfides, and disulfides of naphthalene were either synthesized or purified, and their ultraviolet absorption spectra recorded and correlated.

10609 Synthesis of β-(4-Pyridyl)-DL-Alanine and of β-(4-Pyridyl-1-oxide)-DL-, D-, and L-Alanine. Robert L. Bixler and Carl Niemann. *Journal of Organic Chemistry*, v. 23, Apr. 1958, p. 575-584.

10610 Reaction of the Methiodide of *N,N*-Dimethylaminomethylferrocene With Potassium Cyanide to Form Ferrocylacetonitrile. Daniel Lednicer, Jacque K. Lindsay, and Charles R. Hauser. *Journal of Organic Chemistry*, v. 23, May 1958, p. 653-655.

10611 Reactions of Dipivaloyl With Organometallic Reagents. Melvin S. Newman and Gerald R. Kahle. *Journal of Organic Chemistry*, v. 23, May 1958, p. 666-669.

Dipivaloyl reacts with ethoxyethynylmagnesium bromide and ethoxyethynyllithium to yield 3-*t*-butyl-5, 5-dimethyl-1-ethoxy-3-hydroxy-4-keto-1-hexyne.

10612 Reaction of Vinyl Ethers With Acidic Imino Compounds. A New Synthesis of Some *N*-Vinyl Imides. Junji Furukawa, Akira Onishi, and Teiji Tsuruta. *Journal of Organic Chemistry*, v. 23, May 1958, p. 672-676.

10613 Derivatives of Fluorene. IV. Raney Nickel-Hydrazine Hydrate Reduction of Various Mono- and Dinitrofluorene Derivatives; Some New 9-Substituted Fluorenes. T. Lloyd Fletcher and Moses J. Namkung. *Journal of Organic Chemistry*, v. 23, May 1958, p. 680-683.

A Raney nickel-hydrazine hydrate method for reducing was extended to fluorene derivatives.

10614 1,1-Diethoxy-3-(triphenylstannyl)-2-propyne. O. H. Johnson and J. R. Holum. *Journal of Organic Chemistry*, v. 23, May 1958, p. 738-740.

Synthesis and properties of an acetylenic tin compound containing a potential aldehyde group.

10615 Vinyl-Alkali Metal Compounds. R. G. Anderson, M. B. Silverman, and D. M. Ritter. *Journal of Organic Chemistry*, v. 23, May 1958, p. 750.

Vinyl chloride was reacted with the metal in tetrahydrofuran.

10616* (German.) Reactions Between Chlorosilanes and Chloral Adducts Containing Nitrogen. **Über Umsetzungen von Alkylchlorsilanen mit stickstoffhaltigen Additionsverbindungen des Chlorals.** F. A. Henglein and H. Gräser. *Makromolekulare Chemie*, v. 26, no. 3, 1958, p. 236-244.

The reaction between chlorosilanes and chloral-ammonia, chloral-hydroxylamine, chloralisopropylamine, etc. revealed that only the hydroxyl groups of the chloral adducts react with chlorosilanes.

10617* (English.) **Synthesis and Polymerization of Methacroylacetone.** Ph. Teyssié and G. Smets. *Makromolekulare Chemie*, v. 26, no. 3, 1958, p. 245-251.

The synthesis of a polymerizable β-diketone and methacroylacetone by the usual acylation of an ester by a ketone in the presence of sodium methoxide is described. However, the reaction with acrylic and methacrylic ester yielded important amounts of secondary products, especially substituted cyclohexanediones. A reaction scheme is proposed, which proceeds through an intermediate Michael Addition.

10618 Naturally Occurring Quinones. R. H. Thomson. 302 pp. 1957. Academic Press, New York. (QD341.Q4 T38n)

A comprehensive account of the quinone pigments from the simplest benzoquinones to the complex aphid pigments from a chemical stand-point, with emphasis on their reactions and constitution.

10619* Organic Semiconductors. John J. Bohrer. *New York Academy of Sciences, Transactions*, v. 20, no. 5, Mar. 1958, p. 367-382.

Products of the reaction of polyvinylidene chloride and morpholine are studied.

10620* The Steam Distillation of Volatile Fatty Acids. R. O. Weenink. *New Zealand Journal of Science*, v. 1, no. 1, Mar. 1958, p. 18-22.

Data show the behavior on steam distillation of a mixture of normal saturated fatty acids from formic to decanoic. Volatilities of the C_4 to C_{10} fatty acids are reduced by the presence of higher mol. wt. acids.

10621 Castor Polyols for Urethane Coatings. H. M. Metz, A. Ehrlich, M. K. Smith, and T. C. Patton. *Paint, Oil & Chemical Review*, v. 121, Apr. 17, 1958, p. 6-12.

Seventeen castor polyols were systematically evaluated as potential components for urethane coatings.

10622 The Pentaerythritols. Evelyn Berlow, Robert H. Barth, and John E. Snow. 317 pp. 1958. Reinhold Publishing Corp., New York. (QD305.A4 B45p)

Preparation, properties, reactions, and uses of pentaerythritol, dipentaerythritol, tripentaerythritol, and their derivatives.

10623 Progress in Organic Chemistry. J. W. Cook, editor. v. IV. 256 pp. 1958. Academic Press, New York. (QD251 P94 Vis.)

Reviews natural unsaturated fatty acids; free valence in conjugated organic molecules; oxygen heterocyclic fungal metabolites; natural 2-acylcyclohexane-1:3-diones; degradation and synthesis of peptides and proteins; heterocyclic derivatives of P, As, and Sb.

10624* The Chemistry of Esters of Leuco Vat Dyes. III. The Oxidation of the Mono- and Di-Sulphuric Esters of Quinol (Hydroquinone) and of 1:4-Naphthaquinol With Acidic Hydrogen Peroxide. A. Johnson and M. L. Rahman. *Society of Dyers and Colourists, Journal*, v. 74, Apr. 1958, p. 291-296.

10625* Source Book of Industrial Solvents. v. II. Halogenated Hydrocarbons. Ibert Mellan. 267 pp. 1957. Reinhold Publishing Corp., New York. (TP247.5 M48h Ref.)

A compilation of important physical property data on halogens and halogenated hydrocarbons.

10626 Stability Constants of Metal-Ion Complexes, With Solubility Products of Inorganic Substances. Pt. I. Organic Ligands. Jannik Bjerrum, Gerold Schwarzenbach, and Lars Gunnar Sillen, compilers. 105 pp. 1957. Chemical Society, London. (QD291 C42s)

Presents data as tables from publications earlier than January 1956.

10627* (English.) **Fluorocyclohexanes. II. *Cis- and Trans*-1H:3H- and 1H:4H-Decafluorocyclohexanes.** D. E. M. Evans, et al. **III. 1H:4H/2H- and 1H/2H:4H-Nonafluorocyclohexane and Derived Compounds.** J. A. Godsell, M. Stacey, and J. C. Tatlow. *Tetrahedron*, v. 2, nos. 3/4, May 1958, p. 183-202.

10628* (English.) **Some Remarks on the Theory of Nitration.** T. Urbański J. Hackel. *Tetrahedron*, v. 2, nos. 3/4, May 1958, p. 300-303.

Experiments on "O-nitration" of starch led to the conclusion, that nitration occurs not necessarily by means of NO_2^+ ions, but NO_2^- ions and/or undissociated nitric acid are nitrating agents.

10629 Irradiation of the Biphenyl, Ortho-, Meta-Terphenyl Eutectic. D. R. de Halas. *U. S. Atomic Energy Commission, HW*-54994, Feb. 17, 1958, 14 pp. (UF767 Un3.1hw Contin.)

The stability of the two terphenyls and the biphenyl towards radiolytic damage are about equal, and only slightly greater than that measured for monoisopropylbiphenyl in previous experiments.

10630 Carbon-14 Carboxy-Labeled Polysaccharides. J. D. Moyer and H. S. Isbell. *U. S. Atomic Energy Commission, NBS*-5792, Feb. 28, 1958, 9 pp. (UF767 Un3.1nb Contin.)

Preparation of C^{14} carboxydextran and C^{14} carboxyinulin.

10631* (German.) A Simple Method for the Synthesis of Anhydrous Hydrazine. **Über eine einfache Methode zur Darstellung wasserfreien Hydrazins.** H. Bock. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 293, nos. 5-6, 1958, p. 264-273.

Critical survey of usual methods. Produces 99.5% hydrazine by rectifying 92 wt. % hydrazine, obtained by the Penneman and Audrieth method under a N atmosphere.

10632* (German.) Vibration Spectra of $(CH_3)_3SiOH$, $(CH_3)_3SiF$, and $(CH_3)_3SiSH$. **Die Schwingungsspektren des $(CH_3)_3SiOH$, $(CH_3)_3SiF$ und $(CH_3)_3SiSH$.** H. Kriegsmann. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 294, nos. 3-4, 1958, p. 113-119.

Infrared and Raman Spectra of $(CH_3)_3SiOH$ and $(CH_3)_3SiF$ and Raman Spectrum of $(CH_3)_3SiSH$; frequencies of the individual oscillatory forms. Calculation of the energy constants for the Si-OH, Si-F, and Si-SH compounds.

10633* (Russian.) Synthesis of Vinyl Monomers. **Sintezy vinilovykh monomerov. I.** α-Substituted Derivatives of Vinylphosphinic Acid. **α-Zameshchennye proizvodnye vinilfosfinovoi kisloty.** A. Ia. Iakubovich, L. Z. Soborovskii, L. I. Muler, and V. S. Faermark. **II.** Certain Derivatives of α-Chloroacrylic Acid. **Nekotorye proizvodnye α-khlorakrilovoi kisloty.** A. Ia. Iakubovich, E. P. Pravova, and N. A. Bogoslovskii. *Zhurnal Obshchei Khimii*, v. 28, no. 2, Feb. 1958, p. 317-321.

10634* (Russian.) Simultaneous Hydrolysis of Mono- and Trifunctional Alkyl (Aryl) Chlorosilanes. **O sovmestnom gidrolize mono- i trifunktsional'nykh alkil(aril)khlorsilanov.** K. A. Andrianov, M. Ia. Levshuk, S. A. Golubtsov, and T. A. Krasovskaia. *Zhurnal Obshchei Khimii*, v. 28, no. 2, Feb. 1958, p. 333-336.

A mixture of two polymers results from hydrolysis of a mono- and trifunctional alkyl (aryl) chlorosilane (phenyl- or chlorophenyl-trichlorosilane with triethylchlorosilane) at room temperature. The product forms at elevated temperatures.

10635* (Russian.) Synthesis and Properties of Tetrakis-(Tribenzylsiloxy)-Silane and Tetrakis-(Tribenzylsiloxy)-Methane. **Sintez i svoistva tetrakis-(tribenzylsiloxy)-silana i tetrakis-(tribenzilsiloksi) metana.** V. S. Chugunov. *Zhurnal Obshchei Khimii*, v. 28, no. 2, Feb. 1958, p. 336-339.

Synthesis was as follows: $4(C_6H_5CH_2)_3SiONa + SiCl_4 \rightarrow [(C_6H_5CH_2)_3SiO]_4Si + 4NaCl$.

10636* (Russian.) Alkylation of Diphenyl With Alcohols in the Presence of $BF_3 \cdot H_3PO_4$ Catalyst. **Alkilirovanie difenila spirtami v prisutstvii katalizatora $BF_3 \cdot H_3PO_4$.** N. A. Romadan and S. E. Berga. *Zhurnal Obshchei Khimii*, v. 28, no. 2, Feb. 1958, p. 413-417.

Reactions of isoamyl, isobutyl, isopropyl, *n*-propyl, and *n*-butyl alcohols were studied.

10637* (Russian.) Investigation of the Hydrogen Bond and of Certain Lithocholinic Substances by Means of Infrared Absorption Spectra. **Issledovanie vodorodnoi sviazi v nekotorykh kholiniticheskikh veshchestvakh s pomoshch'iu infrakrasnykh spektrov pogloshcheniia.** S. G. Kuznetsov and V. N. Nikitin. *Zhurnal Obshchei Khimii*, v. 28, no. 2, Feb. 1958, p. 525-528.

The β-diethylaminoethyl ethers of diphenylacetic and benzilic acids, and 1,1-diphenyl-2-(β-diethylamino-ethoxy)-ethanol-1 were studied.

10638* (Russian.) Investigating Separation of Carbon and Oxygen Isotopes by Means of Fractional Distillation of Carbon Dioxide, Methane and Molecular Oxygen. **Issledovanie razdeleniia izotopov ugleroda i kisloroda fraktsionnoi razgonkoi okisi ugleroda, metana i molekuliarnogo kisloroda.** G. G. Deviatykh, A. D. Zorin, and N. I. Nikolaev. *Zhurnal Prikladnoi*, v. 31, no. 3, Mar. 1958, p. 368-375.

10639* (Russian.) Hydrogenation of Glucose in the Presence of a Granulated Skeletal-Nickel Catalyst in a Counter-Flow System. **Gidrirovanie gliukozy v prisutstvii granulirovannogo skeletnogo-nikelevogo katalizatora v protochnykh usloviiakh.** E. M. Adaskin, N. I. Ziminova, B. L. Lebedev, and S. V. Pavlov. *Zhurnal Prikladnoi Khimii*, v. 31, no. 4, Apr. 1958, p. 595-601.

10640* (Russian.) Effect of Increased Pressure on the Course of the Reaction Between Solid Anhydrides and Amines. **Izuchenie Vliianiia povyshennogo davleniia na khod reaktsii mezhdu tverdymi angidridami i aminami.** M. Kh. Gluzman and D. G. Arlozorov. *Zhurnal Prikladnoi Khimii*, v. 31, no. 4, Apr. 1958, p. 657-658.

See also: **10814** (stability of transformer oils); **11496** (polymerization of unsaturated organo-silicon compounds); **11518** (polymerization of organo-silicon compounds).

CHEMISTRY—PHYSICAL

10641* (Russian.) Thermal and Roentgenophasic Analyses of the Cs-BeF_2 System and Its Interrelations With Me_1F and BeF_2 Systems. **Termicheskii i rentgenofazovyi analizy sistemy CsF-BeF_2 i ee vzaimootnosheniia s sistemami tipa Me_1F-BeF_2.** *Akademiia Nauk SSSR, Doklady*, v. 118, no. 5, Feb. 11, 1958, p. 935-937.

10642* (Russian.) Chromium Vapor Pressure Over Solid Chromium-Iron Alloys. **Uprugost' para khroma nad splavami khrom-zhelezo v tverdom sostoianii.** E. Z. Vintaikin. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 5, Feb. 11, 1958, p. 977-979.

The pressure of saturated Cr vapor was measured within the range of 1100-1400 C for computing the thermodynamical functions of these alloys.

10643* (Russian.) The Influence of Silica Gel Surface Dehydration on the Adsorption of Benzene and Hexane Vapors. **Vliianie degidratatsii poverkhnosti silikagelia na adsorbtsiiu parov benzola i geksana.** L. D. Beliakova and A. V. Kiselev. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 298-301.

10644* (Russian.) The Catalytic Activity of Germanium in Relation to the Isotopic Exchange Reaction Between Hydrogen and Deuterium. **Kataliticheskaia aktivnost' germaniia v otnoshenii reaktsii izotopnogo obmena vodoroda s deiteriem.** G. K. Boreskov and V. L. Kuchaev. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 302-304.

10645* (Russian.) Adsorption of Nitrogen Vapors on Graphitized Carbon Blacks and Charcoals. **Adsorbtsiia parov azota na grafitirovannykh sazhakh i ugle.** A. V. Kiselev and E. V. Khrapova. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 4, Apr., p. 389-402.

Calcination of initial and graphitized carbon blacks and charcoals at 1700 C in hydrogen flow. The process considerably decreases the roughness of carbon black surfaces and makes them more uniform. In case of charcoals, it causes partial destruction of its pores and considerably reduces their volume. The isotherm of adsorption of nitrogen vapors in coal raises more abruptly than on carbon black.

10646* (Russian.) Adsorption and Catalysis. **Adsorbtsiia i kataliz. I.** Hydrogenation of Maleic and Fumaric Acids in Liquid Phase. **Gidrogenizatsiia maleinovoi i fumarovoi kislot v zhidkoi faze.** V. V. Patrikeev, A. A. Balandin, and M. L. Khidekel'. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 4, Apr., p. 411-418.

Developing apparatus and proposition of a method for determining surface concentrations in the hydrogenation process. In the study of catalytic hydrogenation processes in a mixture, it is necessary to consider surface concentrations of reactive agents in the moment of reaction.

10647* (Russian.) A Study of the Nature of Ion-Exchange Groups on the Surface of Oxidized Carbon. **Issledovanie prirody ionoobmennykh grupp na poverkhnosti okislennogo uglia.** I. A. Tarkovskaia. *Akademiia Nauk Ukraiins'koi RSR, Dopovidi*, 1958, no. 3, p. 280-283.

10648 Shock Waves in Chemical Kinetics: The Decomposition of N_2O_5 at High Temperatures. Garry Schott and Norman Davidson. *American Chemical Society, Journal*, v. 80, Apr. 20, 1958, p. 1841-1853.

The shock pyrolysis of N_2O_5 in the presence of excess Ar was studied, providing information about the properties and reactions of the nitrate free radical NO_3.

10649 The Pressure-Volume-Temperature Properties of Fluorobenzene. D. R. Douslin, R. T. Moore, J. P. Dawson, and Guy Waddington. *American Chemical Society, Journal*, v. 80, May 5, 1958, p. 2031-2038.

10650 Synthesis and Infrared Study of Some Rhodium Coordination Compounds. James P. Collman and Henry F. Holtzclaw, Jr. *American Chemical Society, Journal*, v. 80, May 5, 1958, p. 2054-2056.

Five rhodium coordination compounds are studied. Previously unknown *cis* and *trans* isomers are reported.

10651 The Fluoride Complexes of Zinc, Copper and Lead Ions in Aqueous Solution. Robert E. Connick and Armine D. Paul. *American Chemical Society, Journal*, v. 80, May 5, 1958, p. 2069-2071.

10652 A Study of the Effects of Ultrasonics on the Particle Size of Certain Suspended Pharmaceuticals. Oscar E. Araujo and Patrick F. Belcastro. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 47, May 1958, p. 309-312.

All suspensions exposed to ultrasonics have a smaller particle size diameter, a slower rate of sedimentation, and are more stable than the control or noninsonated suspensions.

10653 An Infrared Absorption Method for Measuring Phase Transitions of Waxes. J. M. Martin, Jr., R. W. B. Johnston, H. J. Cannon, and M. J. O'Neal. *Analytical Chemistry*, v. 30, May 1958, p. 1005-1006.

Method based on infrared absorption in the 13- to 14-μ region is used to determine transitions of commercial waxes.

10654* (German.) Studies of Transannular Eliminations and Substitutions by Means of Isotopes. **Untersuchungen von transanularen Eliminationen und Substitutionen mit Hilfe von Isotopen.** Vladimir Prelog. *Angewandte Chemie*, v. 70, no. 6, Mar. 21, 1958, p. 145-150.

Tracing with C^{14} and deuterium in the case of medium annular compounds. Tracing the interdependence of the non-classic course, ring size, and kind of inherent hydride-displacements in the case of monosubstituted compounds.

10655* (German.) A Contribution to the Identification of Mineral Oil Hydrocarbons on the Basis of Their Physical Data. **Beitrag zur Identifizierung von Mineralöl-Kohlenwasserstoffen auf Grund ihrer physikalischen Daten.** Ernst Terres. *Brennstoff-Chemie*, v. 39, nos. 7/8, Apr. 1958, p. 97-110.

The indices of refraction densities and molecular weights were used in identifying mineral oil hydrocarbons and in performing the group analysis of Van Nes and Van Westen. Evaluation of mineral oil fractions in relation to their chief constituents.

10656 Shock-Induced Physical and Chemical Surface Changes on Oxide Powders. R. W. Nicholls and W. H. Parkinson. *Canadian Journal of Physics*, v. 36, May 1958, p. 625-627.

10657 Catalysis. v. V. Hydrogenation, Oxo-Synthesis, Hydrocracking, Hydrodesulfurization, Hydrogen Isotope Exchange and Related Catalytic Reactions. Paul H. Emmett, editor. 542 pp. 1957. Reinhold Publishing Corp., New York. (QD501 Em64c)

Five papers dealing with reactions of CO; oxo reaction; direct catalytic synthesis of higher alcohols from CO and H; catalytic hydrogenation of aromatic compounds; H isotopes in the study of hydrogenation and exchange; hydrodesulfurization of liquid petroleum fractions.

10658 How Temperature and Composition Affect Surface and Interfacial Tensions. Wallace R. Gambill. *Chemical Engineering*, v. 65, May 5, 1958, p. 143-146.

10659* Studies on Ion-Exchange. I. General Introduction. K. Klamer and D. W. Van Krevelen. **II. Determination of Ion-Exchange Equilibria.** K. Klamer, J. C. H. Linssen, and D. W. Van Krevelen. *Chemical Engineering Science*, v. 7, no. 4, 1958, p. 197-214.

10660 Reaction Kinetics, Thermodynamics, and Transport in the Hydrogen-Bromine System. Edwin S. Campbell and Robert M. Fristrom. *Chemical Reviews*, v. 58, no. 2, Apr. 1958, p. 173-234.

10661 Heats of Combustion and Molecular Structure. V. The Mean Bond Energy Term for the C-O Bond in Ethers, and the Structures of Some Cyclic Ethers. R. C. Cass, et al. *Chemical Society, Journal*, 1958, Apr., p. 1406-1410.

The mean bond energy term for the C-O bond in ethers is reconsidered in conjunction with combustion data on tetrahydropyran and used in a molecular structural analysis of combustion data on cyclic ethers and on diphenyl ether.

10662 The Kinetics and Mechanisms of Aromatic Halogen Substitution. VI. Some Observations Relating to Substitution *meta-* to Principally *ortho-para*-Directing Substituents; and to Steric Inhibition of Tautomeric Electron Release From the Acetamido-Group. P. B. D. de la Mare and M. Hassan. *Chemical Society, Journal*, 1958, Apr., p. 1519-1524.

10663 Calculations of the Crystal Spectra of Benzene and Naphthalene. D. P. Craig and J. R. Walsh. *Chemical Society, Journal*, 1958, Apr., p. 1613-1623.

10664* (German.) Study of the Influence of the Sulfonic Acid Group on Chemical Reactions. **Zur Kenntnis des Einflusses der Sulfonsäuregruppe auf chemische Reaktionen. V.** Desulfonation and the Fluorescent Colors of Aminonaphthalenesulfonic Acids as a Function of the Position of the Sulfonic Acid Group. **Desulfonierbarkeit und Fluoreszenzfarben der Amino-naphthalin-sulfonsäuren in Abhängigkeit von der Stellung der Sulfonsäuregruppe.** Karl Schriever, Eugen Bamann, and Christine Kraus. *Chemische Berichte*, v. 91, no. 2, 1958, p. 414-417.

10665 Chemisorption. W. E. Garner, editor. 277 p. 1957. Academic Press Inc., New York. (QD501 C42c)

A symposium of 23 papers dealing with the theory of chemisorption and with various aspects of chemisorption on insulators, metals, carbon, and semiconductors.

10666* (French.) An Attempt to Interpret the Formation and Stability of the Hydrogen Bond by Means of Spectrographic Results. **Essai d'interprétation de la formation et de la stabilité de la liaison hydrogène au moyen de résultats spectrographiques.** Marie-Madeleine Bottreau and Jean Gerbier. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 12, Mar. 24, 1958, p. 1840-1843.

A study of intermolecular H bonds, between identical or different molecules. The bonds are formed between two groups each of which belongs to one of the coupled molecules.

10667* (French.) Measuring the Magnetic Susceptibility of Normal Anhydrous Alkanates of Bivalent Cobalt. **Mesure de la susceptibilité magnétique des alcanoates normaux anhydres de cobalt bivalents.** Claude Moreau and Georges Rodier. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 14, Apr. 9, 1958, p. 2127-2129.

Simultaneous thermomagnetic and thermogravimetric measurements are possible under a vacuum or conditioned atmosphere from −180 to +1000 C with an automatic apparatus.

10668* (French.) Optical Anisotropy and Orientation of the Benzene Cycles in Polyphenyl Molecules. **Anisotropie optique et orientation des cycles benzéniques dans des molécules polyphényliques.** Pierre Bothorel. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 14, Apr. 9, 1958, p. 2129-2131.

In polyphenyl molecules where the benzene cycles are electronically independent, the main molecular polarizabilities are simple functions of the main polarizabilities of each cycle and of its orientation in the molecule. Determination of the internal molecular structure and of the minimum distances between unlinked atoms.

10669* (French.) Study of the Dielectric Constants of Certain Organic Liquids in the Presence of Gas at Different Pressures. **Étude des constantes diélectriques de certains liquides organiques en présence de gaz à différentes pressions.** Flavien Lazarre and Grégoire Volovick. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 16, Apr. 21, 1958, p. 2371-2377.

A study of the variations of the dielectric constant of benzene, cyclohexane, paraxylene in the presence of nitrous oxide gas; benzene and cyclohexane in the presence of carbonic acid as a function of pressure.

10670 Vapor Pressure of Titanium Tetrabromide. Elton H. Hall, John M. Blocher, Jr., and Ivor E. Campbell. *Electrochemical Society, Journal*, v. 105, May 1958, p. 271-275.

Measurements were made of the vapor pressure of liquid $TiBr_4$. Combination of this data and thermal data with the calculated entropy of $TiBr_4(g)$ gave the standard entropy: $TiBr_4(s)$, $S°298.2 = 57.6 \pm 0.22$ e.u. This value agrees with Kelley's value 57.2 ± 0.9 e.u. obtained from low temperature heat-capacity measurements.

10671 Vapor Pressure of Titanium Tetrafluoride. Elton H. Hall, John M. Blocher, Jr., and Ivor E. Campbell. *Electrochemical Society, Journal*, v. 105, May 1958, p. 275-278.

Measurements were made of the vapor pressure of solid TiF_4. Combination of this data and thermal data with the calculated entropy of $TiF_4(g)$, $S°_{298.2}=73.2$ e.u., gave the standard entropy: $TiF_4(s)$, $S°_{298.2}=31.3 \pm 0.40$ e.u.

10672 The Partial Molar Heat Contents of Solutes in Sulphuric Acid at 25°C. An Investigation of the Self-Dissociation of Sulphuric Acid. B. J. Kirkbride and P. A. H. Wyatt. *Faraday Society, Transactions*, v. 54, pt. 4, Apr. 1958, p. 483-495.

Standard free energy, heat, and entropy values have been calculated for the autoprotolytic and ionic dehydration forms of dissociation.

10673 The Chemical Effects of Pressure. IV. The Role of Viscosity in Bimolecular Reactions at High Pressures. S. D. Hamann. *Faraday Society, Transactions*, v. 54, pt. 4, Apr. 1958, p. 507-511.

Shows that changes can bring about the retardation of some normal bimolecular reactions, by hindering the migration of the reacting molecules.

10674 Reaction Between Silica and Carbon and the Activity of Silica in Slag Solution. J. D. Baird and J. Taylor. *Faraday Society, Transactions*, v. 54, pt. 4, Apr. 1958, p. 526-539.

The free energy of formation of SiC has been calculated from the results of the reaction: $SiO_2 + 3C = SiC + 2CO$.

10675 The Two-Dimensional Van Der Waals Constants of Molecules Adsorbed on Charcoal and Graphite. J. H. De Boer and S. Kruyer. *Faraday Society, Transactions*, v. 54, pt. 4, Apr. 1958, p. 540-547.

10676 The Sorption Properties of Dimethyldioctadecyl Ammonium Bentonite Using Gas Chromatography. D. White and C. T. Cowan. *Faraday Society, Transactions*, v. 54, pt. 4, Apr. 1958, p. 557-561.

10677 The Extraction of Nitrates by Tri-*n*-Butyl Phosphate (TBP). III. Extraction at Trace Concentrations. E. Hesford and H. A. C. McKay. *Faraday Society, Transactions*, v. 54, pt. 4, Apr. 1958, p. 573-586.

A theory of TBP extractions was developed and was applied to three types of experiments.

10678 Ion-Exchange Resins. J. A. Kitchener. 109 pp. 1957. John Wiley & Sons, New York. (QD561 K64i)

Ion-exchange processes; preparation and applications of ion-exchange resins; physical chemistry of exchange equilibria; kinetics of ion exchange.

10679 (French.) Statistical Theory of the Surface Tension of Binary Mixtures. **Sur la théorie statistique de la tension superficielle des melanges binaires.** A. Englert-Chwoles and I. Prigogine. *Journal de Chimie Physique*, v. 55, no. 1, Jan. 1958, p. 16-25.

The recent theory of Prigogine, Bellemans, and Englert-Chwoles is applied to surface tension. Influence of intermolecular forces and of quantum effects is discussed.

10680 (French.) Investigations of the Mechanism of Chemical Reactions by Isotopic Methods. **Recherches sur le mécanisme des réactions chimiques par les méthodes isotopiques. I.** Hydrogen Exchange and Reactions With Hydrogen Transfer. **Échange de l'hydrogène et réactions avec transfert d'hydrogène. II.** Exchange and Mobility of Oxygen, Sulfur, and Nitrogen. **Echange et mobilité de l'oxygène, du soufre et de l'azote.** A. E. Brodsky. *Journal de Chimie Physique*, v. 55, no. 1, Jan. 1958, p. 26-52.

10681 The Combustion of Zirconium in Oxygen. W. L. Dovle, J. B. Conway, and A. V. Grosse. *Journal of Inorganic and Nuclear Chemistry*, v. 6, no. 2, Apr. 1958, p. 138-144 + 1 plate.

This combustion leads to one of the highest temperatures obtainable by combustion of metals, 4930 K at 1 atm. pressure.

10682 Kinetics of Oxidation-Reduction Reactions of Plutonium. The Reaction Between Plutonium(VI) and Vanadium(III) in Perchlorate Solution. Sherman W. Rabideau. *Journal of Physical Chemistry*, v. 62, Apr. 1958, p. 414-417.

10683 Vapor Pressures and Molecular Composition of Vapors of the Sodium Fluoride-Beryllium Fluoride System. Karl A. Sense and Richard W. Stone. *Journal of Physical Chemistry*, v. 62, Apr. 1958, p. 453-457.

Studies of BeF_2 between 802 and 1025 C showed good agreement with previous data taken over the 802-968 C range. Thermal analysis showed the melting point to be about 545 C. Studies of the system between 509 and 1061 C indicate that the complex $NaBeF_3$ exists in the vapor phase in addition to NaF and BeF_2 and a gaseous Na_2BeF_4 complex is possible.

10684 Kinetics of the Reaction Between Gaseous Ammonia and Sulfuric Acid Droplets in an Aerosol. R. C. Robbins and R. D. Cadle. *Journal of Physical Chemistry*, v. 62, Apr. 1958, p. 469-471.

10685 Physical Properties of Monolayers at the Solid/Air Interface. III. Friction and Durability of Films on Stainless Steel. R. L. Cottington, E. G. Shafrin, and W. A. Zisman. *Journal of Physical Chemistry*, v. 62, May 1958, p. 513-518.

Polar paraffinic compounds and fluorinated derivatives were adsorbed as condensed monolayers at the stainless steel/air interface by retraction from the molten compound or from solution.

10686 Some Properties of Surface Films Formed by Adsorption of *n*-Nonadecanoic Acid on Mechanically Activated Metal Surfaces. Hilton A. Smith and Tomlinson Fort, Jr. *Journal of Physical Chemistry*, v. 62, May 1958, p. 519-527.

The fresh surfaces prepared by machining metals under an inert, non-polar solvent are for a short period chemically hyperactive.

10687 The Adsorption of Polyvinyl Acetate. J. Koral, Robert Ullman, and F. R. Eirich. *Journal of Physical Chemistry*, v. 62, May 1958, p. 541-550.

Studies the adsorption of polyvinyl acetate on to solid surfaces under a variety of conditions.

10688 Molecular Weight Distribution of "Living Polymers". II. Effect of Impurities. M. Szwarc and M. Litt. *Journal of Physical Chemistry*, v. 62, May 1958, p. 568-569.

A polymerization in which a monomer containing small amounts of impurities is added slowly to a stirred reactor.

10689 Miscibility of Metals With Salts in the Molten State. III. The Potassium-Potassium Halide Systems. J. W. Johnson and M. A. Bredig. *Journal of Physical Chemistry*, v. 62, May 1958, p. 604-607.

10690* (German.) A Contribution to the Knowlege of the System Na^+-Ca^{++}-OH^--SO_4^{--}-H_2O. **Zur Kenntnis des Systems Na^+-Ca^{++}-OH^--SO_4^{--}-H_2O. II.** The Unstable Salt Pair. **Das instabile Salzpaar.** H. J. Bittrich and E. Leibnitz. *Journal für Praktische Chemie*, v. 6, ser. 4, no. 1, Feb. 1958, p. 4-7.

Study of the unstable salt pair NaOH-$CaSO_4$ in aqueous solution. Dependence of the reaction of the two constituents on time, initial molecular concentration of the lye solution, and the initial relationship of NaOH:$CaSO_4$.

10691* Description and Analysis of the Second Spectrum of Molybdenum, Mo II. C. C. Kiess. *Journal of Research, National Bureau of Standards*, v. 60, no. 4, Apr. 1958, p. 375-422.

Wavelengths and estimated intensities are presented for 3,800 lines of Mo II in the range from 100 to 1550 A.

10692* (Russian.) Graphical Method of Calculation of Binary Azeotropic Mixtures. **Graficheskii metod rascheta binarnykh azeotropnykh smesei.** K. E. Novikova and A. G. Natradze. *Khimicheskaia Promyshlennost'*, 1958, no. 2, Mar., p. 102-105.

10693* (Russian.) Electrochemical Characteristics of Ion-Exchange Membranes. **Elektrokhimicheskaia kharakteristika ionoobmennykh membran.** V. A. Zarinskii and Ia. M. Kots. *Khimicheskaia Promyshlennost'*, 1958, no. 2, Mar., p. 115-116.

10694* (German.) Adsorption Power and Specific Surface of Silicates With Tubular Primary Crystals. **Adsorptionsvermögen und spezifische Oberfläche von Silikaten mit röhrenförmig gebauten Primärkristallen.** W. Noll, H. Kircher, and W. Sybertz. *Kolloid-Zeitschrift*, v. 157, no. 1, Mar. 1958, p. 1-11.

An electron microscopic investigation of chrysotile, garnierite, and metahallovsite.

10695* (German.) Determining the Molecular Weight of Polyamides by Measuring the Scattered Light. **Zur Molekulargewichtsbestimmung an Polyamiden durch Lichtzerstreuungsmessungen.** H. G. Fendler and H. A. Stuart. *Makromolekulare Chemie*, v. 25, no 3, Feb. 1958, p. 159-175.

The mol.wt. of perlon was determined by measuring light scattering in formic acid. The effects of polyelectrolyte, association complexes, and temperature dependence of the scattered intensity are discussed.

10696* (English.) **Viscometric Investigation of Polyvinyl Pyridine Silver Interaction.** Sadhan Basu and Sunil Kumar Podder. *Makromolekulare Chemie*, v. 25, no. 3, Feb. 1958, p. 210-216.

Viscosimetric behavior of a polyvinyl pyridine and $AgNO_3$ mixture in alcoholic solution showed that the system behaves like a polyelectrolyte. This is explained by the structure of pyridine-silver complex.

10697* (English.) **On the Molecular Weight Determination of Poly(Ethylene Terephthalate).** André Conix. *Makromolekulare Chemie*, v. 26, no. 3, May 1958, p. 226-235.

Number average molecular weights were determined on a series of unfractionated poly(ethylene terephthalate) samples by carboxyl and hydroxyl end group assay methods.

10698* (Russian.) The Vibrational Spectra and Potential Energy Constants of Methylsilane and Methyldeuterosilane. **Kolebatel'nye spektry i postoiannye potentsial'noi energii metilsilana i metiltrideiterosilana.** I. F. Kovalev. *Optika i Spektroskopiia*, v. 4, no. 5, May 1958, p. 560-568.

10699* (Russian.) Luminescence and Absorption of Pyrene and 3,4-Benzopyrene in the Frozen Solutions in Normal Paraffins. **Liuminestsentsiia i pogloshchenie pirena i 3,4-benzpirena v zamorozhennykh rastvorakh normal'nykh parafinov.** E. V. Shpol'skii and E. A. Girdzhiiauskaite. *Optika i Spektroskopiia*, v. 4, no. 5, May 1958, p. 620-630.

10700* (Russian.) On the Dependence of the Fluorescence Spectra of Solutions of Mesosubstituted Anthracene on the Concentration of Dissolved Substance. **O zavisimosti spektrov fluorestsentsii rastvorov mezozameshchennykh antratsena ot kontsentratsii rastvorennogo veshchestva.** G. A. Tishchenko, B. Ia. Sveshnikov, and A. S. Cherkasov. *Optika i Spektroskopiia*, v. 4, no. 5, May 1958, p. 631-636.

10701 Organic Electrode Processes. Milton J. Allen. 174 pp. 1958. Reinhold Publishing Corp., New York. (QD273 A154o)

Basic simplified electrochemical theory and the instrumentation and methods used in application. Type reactions and mechanisms of cathodic and anodic processes.

10702 The Physical Chemistry of Electrolytic Solutions. Herbert S. Harned and Benton B. Owen. 3rd Ed. 803 pp. 1958. Reinhold Publishing Corp., New York. (QD561 H22p3)

10703* (English.) **A General Method of Calculating Thermodynamic Parameters in Gas Flow Processes in a Variable Regime.** G. Bărănescu. *Revue d'Électrotechnique et d'Énergétique*, v. 1, no. 2, 1956, p. 105-125.

Graphical method uses thermodynamic diagrams which consider the variation of specific heat in relation to temperature (case of a perfect gas), and the change in the chemical composition provoked by pressure and temperature.

10704 The Point of Oxygen Attack in the Combustion of Hydrocarbons. I. The Origin of Carbon Monoxide. C. F. Cullis, F. R. F. Hardy, and D. W. Turner. *Royal Society, Proceedings*, v. 244, ser. A, Apr. 22, 1958, p. 573-580.

Elucidates the point of initial attack in gaseous oxidation processes, using ^{14}C-labeled hydrocarbons.

10705 Surface Chemistry. Theory and Applications. J. J. Bikerman. 2nd Ed. 501 pp. 1958. Academic Press, New York. (QD549 B48s2)

Current theory of liquid-gas, liquid-liquid, solid-gas, solid-liquid, solid-liquid-gas, solid-liquid-liquid, and electric surface phenomena is presented.

10706* Factors Influencing the Crystal Structure of Cellulose Triacetate. B. S. Sprague, J. L. Riley, and H. D. Noether. *Textile Research Journal*, v. 28, Apr. 1958, p. 275-287.

Heat has demonstrated the existence of two stable polymorphic crystalline forms and conditions for achieving each structure is given.

10707 Transport Properties in Gases. Proceedings of the Second Biennial Gas Dynamics Symposium. Ali Bulent Cambel and John B. Fenn, editors. 182 pp. 1958. Northwestern University Press, Evanston. (QD511 G21p Over.)

Eighteen symposium papers plus a list of 106 pertinent references.

10708* Adsorption Kinetics in the Conversion of Carbon Dioxide to Methane. Jacob B. Romero and L. N. Johanson. *Trend in Engineering (University of Washington)*, v. 10, no. 2, Apr. 1958, p. 17-24.

Adsorption rates in the N_2-H_2; N_2-CO_2; N_2-H_2O; N_2-CH_4; N_2-CO_2-CH_4-H_2O; and H_2-CH_4-H_2O systems were studied at 500, 600, 700, and 750 F and pressure close to one atmosphere on ⅝-in. supported Ni catalyst pellets.

10709 (Russian.) Determination of the Interaction of Substances in Solution by the Crystallization Temperature of the Solvent. **Opredelenie vzaimodeistviia veshchestv v rastvore po temperature kristallizatsii rastvoritelia.** Ia. A. Fialkov and V. B. Chernogorenko. *Ukrainskii Khimicheskii Zhurnal*, v. 24, no. 1, 1958, p. 13-22.

Comparison of cryoscopic methods of physico-chemical analysis of solutions with the method of crystallization range of the solvent. In some cases investigation of the secondary range of the crystallization (solidus) is necessary.

10710 (Russian.) Solubility of Metal Oxides in Fused Sodium Meta- and Pyro Phosphates. **Rastvorimost' okislov metallov v rasplavlennom metafosfate i pirofosfate natriia.** V. N. Andreeva. *Ukrainskii Khimicheskii Zhurnal*, v. 24, no. 1, 1958, p. 23-28.

Investigation of the solubility of Sb_2O_3, MoO_3, PbO, Bi_2O_3, CuO, ZnO, NiO, WO_3, CdO, Fe_2O_3, and TiO_2 by the isothermic saturation method, in fused metaphosphate at 720 C and in pyrophosphate at 1000 C.

10711 (Russian.) Physical Properties and Structure of Fatty Acid Solutions in Acetone. **Fizicheskie svoistva i stroenie rastvorov kislot zhirnogo riada v atsetone.** A. Z. Golik and R. F. Mocharniuk. *Ukrainskii Khimicheskii Zhurnal*, v. 24, no. 1, 1958, p. 33-36.

Determination of density, viscosity, latent heat of evaporation, and critical parameters of fatty acid solutions in acetone. Relationship between viscosity and temperature shows that the higher the critical temperature of the solution, the higher their viscosity. This dependence is subordinated to the exponential law, but the activation energy of viscous flow is a complex function of the concentration.

10712 (Russian.) Catalytic Oxidation of Propylene on Silver. **Kataliticheskoe okislenie propilena na serebre.** Ia. B. Gorokhovatskii and M. Ia. Rubanik. *Ukrainskii Khimicheskii Zhurnal*, v. 24, no. 1, 1958, p. 63-67.

Investigation of the oxidation process of propylene on Ag catalyst in a temperature range from 130-260 C with contact intervals of 0.6-6.0 sec. The basic products are CO_2 and H_2O; amount of propylene oxide does not exceed 0.07%; aldehydes and acids are absent completely. Treatment of Ag catalyst with NaCl decreases its total activity and increases formation of propylene oxide.

10713 Predictions on the Chemical Behavior of Iodine in an LMFR Fuel. O. E. Dwyer. *U. S. Atomic Energy Commission, BNL*-454, Apr. 15, 1957, 12 pp. (UF767 Un3.1bn Contin.)

Kinetic and thermodynamic analyses.

10714 A Kinetic Study of the Reduction of Uranium Oxides With Hydrogen. W. R. DeHollander. *U. S. Atomic Energy Commission, HW*-46685, Nov. 8, 1956, 35 pp. (UF767 Un3.1hw Contin.)

10715 Effect of Geometrical Shape on the Continuous Dissolution of Aluminum in Mercury-Catalyzed Nitric Acid. A. F. Boeglin and J. A. Buckham. *U. S. Atomic Energy Commission, IDO*-14425, Dec. 31, 1957, 26 pp. (UF767 Un3.1id Contin.)

All variables tested (shape, feed rate, and catalyst concentration) as well as all first order interactions of these variables have a significant effect upon the dissolution properties of Al reactor fuel elements.

10716 Steric Effects on the Formation Constant of Metal Chelates of *Beta*-Diketones. G. A. Guter and G. S. Hammond. *U. S. Atomic Energy Commission, ISC*-673, Aug. 1955, 62 pp. (UF767 Un3.1is Contin.)

Chelating ability may be greatly altered by changing the steric requirements of the ligand. A simple method for determining the extent of enolization of β-diketones and the kinetics of enolization is presented. Procedure for separation of Li from other alkali metal ions makes use of the selectivity of dipivaloylmethane.

10717 Chemical Effects of Photonuclear Reactions in the Propyl Bromides. A. E. Richardson and A. F. Voigt. *U. S. Atomic Energy Commission, ISC*-855, Dec. 1956, 82 pp. (UF767 Un3.1is Contin.)

The chemical nature of the products resulting when the propyl bromides were irradiated with neutrons and 70 mev. γ-rays was studied by established techniques.

10718 Surface Tensions of Some Binary Fused Salt Systems. June L. Dahl and F. R. Duke. *U. S. Atomic Energy Commission, ISC*-923, June 1957, 82 pp. (UF767 Un3.1is Contin.)

Surface tensions of $NaNO_3$, KNO_3, $AgNO_3$, LiCl, NaCl, $PbCl_2$, KCl, and $ZnCl_2$ and the binary mixtures $NaNO_3$-KNO_3, $AgNO_3$-$NaNO_3$, $AgNO_3$-KNO_3, NaCl-KCl, $PbCl_2$-LiCl, $PbCl_2$-NaCl, $PbCl_2$-KCl, $PbCl_2$-RbCl, and $PbCl_2$-CsCl were measured by the maximum bubble pressure method.

10719 Thermal Stability of Hydrous Aluminum Oxides. F. J. Shipko and R. M. Haag. *U. S. Atomic Energy Commission, KAPL-1740*, July 10, 1957, 33 pp. (UF767 Un3.1ka Contin.)

Decomposition of the various hydrous oxides was studied under static conditions. The different modifications of hydrous alumina are compared and their structures are related to the method of preparation.

10720 The Thermal Stability of Uranium Dioxide. L. G. Wisnyi and S. W. Pijanowski. *U. S. Atomic Energy Commission, KAPL-1702*, Nov. 1, 1957, 20 pp. (UF767 Un3.1ka Contin.)

The m.p. of UO_2 was determined in H, He, and Ar to be 2760 ± 30 C.

10721 The Adaptation of New Research Techniques to Mineral Engineering Problems. *U. S. Atomic Energy Commission, NYO-4876*, Jan. 31, 1958, 37 pp. (UF767 U3ny Contin.)

A progress report on research on flotation, surface chemistry, solvent extraction, comminution, thickening and thickeners, and electrostatic separation of minerals.

10722 Volumetric and Thermodynamic Properties of Normal Fluids. Kenneth S. Pitzer. *U. S. Atomic Energy Commission, UCRL-8093*, Jan. 1958, 44 pp. (UF767 U3u Contin.)

Tables and equations used for predicting properties.

10723 A Method for Estimating the Heat of Formation of Inorganic Compounds. Howard W. Anderson. *U. S. Atomic Energy Commission, UCRL-8152*, Jan. 1958, 55 pp. (UF767 U3u Contin.)

Estimation for a halide compound is possible when experimental data are available for two other halides of the metallic ion.

10724 The Volumetric and Thermodynamic Properties of Fluids. V. Two Component Solutions. Kenneth S. Pitzer and Glen O. Hultgren. *U. S. Atomic Energy Commission, UCRL-8165*, Feb. 1958, 12 pp. (UF767 U3u Contin.)

The acentric factor theory of volumetric behavior of pure fluids is applied to mixed gases. The pseudocritical temperature and pressure and the acentric factor are evaluated for 12 binary systems each at several compositions.

10725 Composition and Thermodynamic Properties of Air in Chemical Equilibrium. W. E. Moeckel and Kenneth C. Weston. *U. S. National Advisory Committee for Aeronautics, Technical Note 4265*, Apr. 1958, 39 pp. (TL570 Un3t Vis.)

Charts relate the thermodynamic properties of air in chemical equilibrium for temperatures to 15,000 K and for pressures from 10^{-5} to 10^{+4} atm. Also included are charts showing the composition of air, isentropic exponent, and speed of sound.

10726* (Russian.) Structure and Nature of the Bonds in Aromatic Metal Complexes. **Stroenie i priroda sviazei v aromaticheskikh kompleksakh metallov.** M. E. Diatkina. *Uspekhi Khimii*, v. 27, no. 1, Jan. 1958, p. 57-93.

Geometry of the molecules. Energies of cyclopentadiene metal compounds; their magnetic properties; vibrational, mass, and electron spectra and X-ray absorption spectra; chemical properties.

10727* (Russian.) Chemical Action of Atoms Obtained as a Result of Nuclear Transformations. **Khimicheskoe deistvie atomov, poluchaiushchikhsia v rezul'tate iadernykh prevrashchenii.** An. N. Nesmeianov and E. A. Borisov. *Uspekhi Khimii*, v. 27, no. 2, Feb. 1958, p. 133-161.

Behavior of atoms formed by capture of slow neutrons. Effects of temperature and the state of aggregation on retention in organic compounds after (n,γ) reactions. Effect of the mass of the colliding particles and the initial energy of the atoms.

10728* (German.) Water Vapor Solubility of Salts. **Die Wasserdampflöslichkeit von Salzen.** H. E. Hömig. *Vereinigung der Grosskesselbesitzer, Mitteilungen*, no. 52, Feb. 1958, p. 9-14.

Effects of partial pressure, density, and dielectric constants on vapor solubility. Solubility of NaCl in water vapor. Theoretical considerations. Salt contents in vapor of high pressure boilers. Dissociation and hydrolysis. Effect of pressure on the distribution coefficients.

10729* (German.) The Problem of β-Tungsten. **Zum Problem des β-Wolframs.** J. Neugebauer, A. J. Hegedüs, and T. Millner. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 293, nos. 5-6, 1958, p. 241-250.

Producing β-W from WO_2. The effect of foreign substances, especially of phosphoric acid, on the $\beta \rightarrow \alpha$ transformation. Oxygen content and change in weight of β-W.

10730* (German.) The Mechanism of the Oversensitization of Photographic Emulsions. A Contribution to the Problem of the Transfer of Energy. **Zum Mechanismus der Übersensibilisierung photographischer Emulsionen—ein Beitrag zum Problem der Energieübertragung. I-II.** R. Brünner, A. E. Oberth, G. Pick, and G. Scheibe. *Zeitschrift für Elektrochemie, Berichte der Bunsengesellschaft für Physikalische Chemie*, v. 62, no. 2, 1958, p. 132-152.

10731* (German.) Investigations of the Effect of Temperature on the Oriented Intergrowth of Organic Substances. **Untersuchungen über den Einfluss der Temperatur auf die orientierte Kristallabscheidung organischer Stoffe.** M. Brandstätter-Kuhnert. *Zeitschrift für Kristallographie*, v. 110, no. 1, Mar. 1958, p. 1-10.

An increase of temperature has different effects upon the two organic partners of oriented intergrowth: for the guest component it usually means greater ease of the orientation effect. In some cases even a minimum temperature has to be reached before orientation can take place. The higher temperature of the host usually has an unfavorable influence.

10732* (German.) Ion Reactions in Polyelectrolytes, First Stages in Gel Formation. **Über Ionenreaktionen bei Polyelektrolyten, Vorstufen bei der Bildung von Gelen.** H. Thiele and E. Schacht. *Zeitschrift für Physikalische Chemie (Leipzig)*, v. 208, nos. 1/2, Dec. 1957, p. 42-58.

Investigation of the behavior of diluted alginate sol with different cations by measuring the viscosity and conductivity during equilibrium dialysis. Behavior of alginic acid as a polyelectrolyte.

10733* (German.) The Photochemical Behavior of Alkali-Organic Additive Compounds Dissolved in Organic Liquids. **Über das photochemische Verhalten von in organischen Flüssigkeiten gelösten alkaliorganischen Additionsverbindungen. I.** Absorption Spectra. **Absorptionsspektren. II.** Increase in the Electric Conductivity During Light Exposure. **Zunahme der elektrischen Leitfähigkeit bei Belichtung.** R. Suhrmann and R. Matejec. *Zeitschrift für Physikalische Chemie* (Neue Folge), v. 14, nos. 3/4, Feb. 1958, p. 246-275.

10734* (English.) **The Relation Between Frequency Factor and Activation Energy (Compensation Law.)** Paul Rüetschi. *Zeitschrift für Physikalische Chemie* (Neue Folge), v. 14, nos. 5/6, Mar. 1958, p. 277-291.

The empirical relation in the Arrhenius-equation for rate processes is discussed on the basis of statistics and potential energy surfaces.

10735* (German.) "Permselectivity and Semipermeability" of Copperferrocyanide Membrane. **Zur Permselektivität und Semipermeabilität der Kupferferrocyanidmembran.** V. Freise. *Zeitschrift für Physikalische Chemie* (Neue Folge), v. 15, nos. 1-6, Apr. 1958, p. 48-63.

Describes two modifications of copper ferrocyanide ($Cu_2Fe(CN)_6$) one, forming membranes with a selective permeability for K and Na ions, and the other a semipermeable for water (for measuring osmosis pressure).

10736* (Russian.) Methods for Calculating the Properties of Quinary Systems From Data on Binary Systems. **Metody rascheta svoistv piaternykh sistem po dannym dlia dvoinykh sistem. II.** S. D. Gromakov. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 2, Feb. 1958, p. 232-257.

An equation for the hypersurface of properties in a quinary dimensional system is derived for calculating the properties of quinary reciprocal systems.

10737* (Russian.) The Semi-Conductor Properties of Phthalocyanines. **Poluprovodnikovye svoistva ftalotsianinov. II.** The Spectral Dependence of the Photoconductivity and the Optical Activation Energy of Phthalocyanines. **Spektral'naia zavisimost' fotoprovodimosti i opticheskaia energiia aktivatsii ftalotsianinov.** A. T. Vartanian and I. A. Karpovich. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 2, Feb. 1958, p. 274-281.

10738* (Russian.) A Kinetic Study of the Anodic Dissolution of Germanium. **Issledovanie kinetiki anodnogo rastvoreniia germaniia.** E. A. Efimov and I. G. Erusalimchik. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 2, Feb. 1958, p. 413-417.

Shows that the anodic dissolution of the *n*-type at current densities exceeding 3×10^{-3} a/cm^2 is a slower reaction than that of the *p*-type.

10739* (Russian.) Allylbenzene Transformation on Alumosilicate Catalyst. **Prevrashchenie allibenzola na aliumosilikatnykh katalizatorakh. I.** Study of the Transformation Kinetics. **Izuchenie kinetiki prevrashcheniia.** K. V. Topchieva, A. I. Pletiushkina, and I. A. Zen'kovich. **II.** Structure and Mechanism of Formation of the Dimer. **Stroenie i mekhanizm obrazovaniia dimera.** K. V. Topchieva, A. I. Pletiushkina, and V. A. Tronova. *Zhurnal Obshchei Khimii*, v. 28, no. 3, Mar. 1958, p. 624-634.

10740* (Russian.) Kinetics of Absorption of Nitrogen Oxides by Nitric Acid. **Kinetika pogloshcheniia okislov azota kontsentrirovannoi azotnoi kislotoi.** V. I. Atroshchenko and V. M. Kaut. *Zhurnal Prikladnoi Khimii*, v. 31, no. 3, Mar. 1958, p. 352-360.

See also: **10450** (vapor-liquid equilibria in the ternary system ethyl acetate-benzene-cyclohexane); **10469** (phase relations of gas-condensate fluids); **10502** (gas chromatographic separation of allylic bromides); **10577** (kinetics of Friedel-Crafts benzolation of benzene); **10596** (structure of osazones); **10597** (kinetics of propylene polymerization); **10608** (ultraviolet absorption spectra of naphthalene derivatives); **10620** (steam distillation of fatty acids); **10626** (stability constants of metal-ion complexes); **10632** (vibration spectra of organo-silicon compounds); **10640** (effect of pressure on the reaction between anhydrides and amides); **11201** (thermodynamics of binary alloys of group IIB); **11309** (diffusion of H in metals); **11325** (absorption properties of Ni powder); **11392** (radioisotopes).

COATINGS

10741 Some Developments and Applications of Brittle Lacquers. A Survey of Published Work and Some Original Contributions. I. J. R. Linge. *Aircraft Engineering*, v. 30, Apr. 1958, p. 94-100.

General principles involved; types of crack pattern; strain sensitivity; tests required; lacquer development; recent investigations. (To be continued.)

10742* (Russian.) The Structure of Thin Sb_2S_3 Films Obtained by Sublimation in a Nitrogen Atmosphere at Pressures Below 4 mm. Hg. **O strukture tonkikh plenok Sb_2S_3, polucheniykh vozgonkoi v atmosfere azota pri davleniiakh nizhe 4 mm Rt. St.** A. M. Reshetnikov. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 1, Mar. 1, 1958, p. 75-78 + 1 plate.

10743* (Russian.) A Study of the Structure and Phase Composition of Coatings in the Hot Tinning of Sheet Iron. **Izuchenie struktury i fazovogo sostava pokrytiia pri goriachem luzhenii zhesti.** A. I. Vtikin, T. P. Plotnikova, and G. A. Kokorin. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 268-270 + 1 plate.

10744* (Italian.) The Vitreous Enameling of Aluminum. **La smaltatura vetrosa dell'alluminio.** *Alluminio*, v. 27, no. 4, Apr. 1958, p. 189-196.

10745 Quantitative High-Temperature Oxidation of Porcelain Enameled Iron. H. G. Lefort and A. L. Friedberg. *American Ceramic Society, Journal*, v. 41, June 1958, p. 216-226.

A continuous gain-in-weight method was used to measure the oxidation place on enameled and unenameled iron. Oxidation was studied as a function of time and temperature on both bare and enameled iron. The rate of oxidation of enameled iron was lower than that of bare specimens at all temperatures.

10746 Industrial Epoxy Emulsions. J. M. Thomas. *American Paint Journal*, v. 42, May 19, 1958, p. 44 + 5 pages.

Problems and typical formulations using Poly-Tex 611-B emulsified resin.

10747 Water Reducible Acrylic Industrial Finishes. Gerould Allyn. *American Paint Journal*, v. 42, May 19, 1958, p. 84 + 3 pages.

Formulation and application of these vehicles.

10748 Metal Coloring. II. Coloring of Iron and Steel. R. Hoeltgen. *Henry Brutcher Translation No.* 4049, 4 pp. (From *Metallwarenindustrie und Galvanotechnik*, v. 48, no. 5, May 1957, p. 214-215.) Henry Brutcher, Altadena, Calif.

Formulas for coloring iron and steel brownish-black, black ("Swiss Mat"), and blue.

10749 Heat-Resisting Hard Iron-Chrome-Nickel Facings. G. Faber. *Henry Brutcher Translation No.* 4072, 11 pp. (From *Schweizer Archiv*, v. 23, no. 1, 1957, p. 14-19.) Henry Brutcher, Altadena, Calif.

Swiss work on use of σ-phase for abrasion and scaling-resistant hard facings on steel. Precipitation-hardening facing alloys. Hard facings produced by diffusion of Cr into austenite.

10750 Service Life of Aluminized Steel Parts at High Temperatures. P. Gröbner. *Henry Brutcher Translation No.* 4077, 16 pp. (From *Hutnické Listy*, v. 10, no. 10, 1955, p. 600-605.) Henry Brutcher, Altadena, Calif.

Attempt to estimate the life of pack-aluminized carbon steel exposed to various high temperatures in air or combustion gases. Potentialities of alloying the steel base with elements forming stable phases with Al and thereby retarding the diffusion of Al into the steel core.

10751 Boronizing of Working Surfaces of Low-Alloyed Steels. V. D. Taran and L. L. Skugorova. *Henry Brutcher Translation No.* 4084, 9 pp. (From *Vestnik Mashinostroeniia*, v. 37, no. 5, 1957, p. 62-65.) Henry Brutcher, Altadena, Calif.

Electrolytic boronizing procedure. Greatest wear resistance in the boronized layer is obtained by six hours treatment at 920-950 C.

10752 How Enamels, Glasses and Glazes Are Apacified. II. William W. Coffeen. *Ceramic Industry*, v. 70, May 1958, p. 76 + 2 pages.

Characteristics of opaque systems for ceramic applications.

10753 Microbiological Deterioration of Buried Pipe and Cable Coatings. F. E. Kulman. *Corrosion*, v. 14, May 1958, p. 23-32.

Visual tests of 28 coating materials showed that only half were inherently inert to the attack of four selected species of fungi.

10754 Experience With Sweet Oil Well Tubing Coated Internally With Plastic. Joy T. Payton. *Corrosion*, v. 14, May 1958, p. 33-35.

Data are reported showing extent to which the various coatings were used with respect to the salt water content for both flowing and gas lift wells. The use of wire line tools, caliper surveys, length of service for various coatings, and types of failure experienced.

10755 Paint Research and Technology. v. II. Papers Presented at the 1958 Short Course in Paint Technology, Feb. 3-7, 1958. *Florida. University. Engineering and Industrial Experiment Station Bulletin No.* 94, Dec. 1957, 156 pp. (TA1 F66b Contin.)

Papers deal with resin developments for industrial and maintenance coatings, properties and applications for colored pigments, impact of nuclear energy on organic coatings, exterior paints for wood and masonry, microorganisms in paints and coatings, and additives for paints.

10756 Thin Films of Polytetrafluoroethylene Resin as Lubricants and Preservative Coatings for Metals. V. G. Fitzsimmons and W. A. Zisman. *Industrial and Engineering Chemistry*, v. 50, May 1958, p. 781-784.

Shows that there is no limit to the lubrication problems Teflon can solve in the laboratory or in industry.

10757 Our Two Years With Airless Paint Spray. Henry M. Carr. *Industrial Finishing*, v. 34, no. 6, Apr. 1958, p. 34 + 5 pages.

Atomization is accomplished by heat and pressures of 500 to 600 psi. Advantages are listed.

10758 Why You Need and How to Have Clean Dry Compressed Air. A. N. Gustafson. *Industrial Finishing*, v. 34, no. 6, Apr. 1958, p. 66 + 5 pages.

Factors affecting moisture balance of compressed air; techniques for eliminating water from air lines.

10759* Corrosion-Resistant Metal Coatings. *Industrial Finishing (London)*, v. 10, Apr. 1958, p. 33-34.

Table lists method of application and protective uses of 26 coating metals.

10760* Ceramic Coatings Prevent Corrosion. *Industrial Finishing (London)*, v. 10, Apr. 1958, p. 40 + 4 pages.

Research and development progress in the use of ceramic coatings to protect metals from high-temperature atmospheric corrosion.

10761 Firing Vitreous Enamels on Aluminum in a Conveyorized Oven. L. T. Ives. *Industrial Heating*, v. 25, Apr. 1958, p. 771 + 4 pages.

Properties and advantages; preparation of metal and enamel; firing procedures; design and operation of oven.

10762 Priming Paints for Light Alloys. J. G. Rigg and E. W. Skerrey. *Institute of Metals, Journal*, v. 86, pt. 9, May 1958, p. 421-424.

Resistance to corrosion of light alloy and mild-steel specimens with various primers and Al top coats, exposed for 10 yr. in rural and marine atmospheres.

10763* Effect of Flow Rate on Paraffin Accumulation in Plastic, Steel, and Coated Pipe. F. W. Jessen and James N. Howell. *Journal of Petroleum Technology*, v. 10; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 213, Apr. 1958, p. 80-84.

A comparison of the relative effectiveness of several plastic materials in the control of paraffin accumulation in crude petroleum pipelines.

10764* Structure and Mechanism of Dehydrochlorination of Polyvinyl Chloride. B. Baum and L. H. Wartman. *Journal of Polymer Science*, v. 28, Apr. 1958, p. 537-546.

The loss of each molecule of HCl from the polymer results in the formation of a double bond, which activates adjacent chlorine and causes the decomposition reaction to propagate along the resin chain.

10765 Ceramic Coating of Magnesium. Paul A. Huppert. *Light Metal Age*, v. 57, Apr. 1958, p. 8-10.

Background of enameling on Mg; requirements for protecting Mg; metal pretreatment; frit compositions; mill additions; application techniques.

10766 (Russian.) Operation of Metallizing Devices. **Ekspluatatsiia metallizatsionnykh apparatov.** 107 pp. 1955. State Scientific-Technical Publishing House "Mashgiz", Moscow. (TS655 M85e)

Description of various types of machines manufactured in U.S.S.R. Handbook for operators.

10767 Internal Pipe Coating. *Paint, Oil & Chemical Review*, v. 121, Apr. 17, 1958, p. 18.

Copon, an erosion-proof, friction-reducing industrial coating, is being used to protect the inside of a 72-mile gas pipe line.

10768* Review and Buyers' Guide. S. Chibnik, compiler. *Paint and Varnish Production*, v. 48, no. 3, Feb. 1958, p. 5-150.

A review of recent literature on synthetic resins, latex emulsions, pigments, solvents, drying oils and fatty acids, intermediates, additives, production, testing, and architectural and industrial finishes. A compilation of new materials and equipment is included.

10769 Preparation of Protective Coatings by Electrophoretic Methods. Allen C. Werner and Robert J. Abelson. *U. S. Air Force. Wright Air Development Center. WADC Technical Report* 58-11, Feb. 1958, 22 pp. (TL507 Un3.18w Vis.)

Multilayer coatings for Mo of 80% Ni-20% Cr and Ni-bonded Cb and TiC provided good oxidation resistance and good erosion resistance. The ballistic impact resistance requirement was fulfilled by inclusion of a 50% dense, 80% Ni-20% Cr layer.

10770* (French.) Theory of the Formation of Thin Films on Solids by Thermal Vaporization in Vacuum. **Théorie sur la formation de films minces sur les solides par vaporisation thermique dans le vide.** J. M. Dunoyer. *Vide*, v. 12, no. 72, Nov.-Dec. 1957, p. 432-439.

General considerations on adsorption. Case of molecules or atoms in the vapor form, inpinging on a solid surface. The Frenkel, quantitative, and Lennard-Jones theories.

See also: **10621** (castor polyols in urethane coatings); **11052** (direct-reading glossmeter); **11121** (oxide films on Mo and W); **11142** (corrosion resistance of Zn plate); **11200** (surface foreign layers and temper deposited metal coatings).

CONTROL SYSTEMS, COMPUTERS, AND SYSTEMS ENGINEERING

10771 The Line That Made Headlines. William Wagenseil. *American Machinist*, v. 102, May 5, 1958, p. 106-109.

Details on how the Hughes Aircraft line cuts costs and speeds simultaneous production of a wide variety of precision aircraft parts.

10772 Analytical Laboratory Operation and Control. Utilizing Business Machine Punched Card Procedures. L. M. Addison, E. H. Spencer, and E. M. Charlet. *Analytical Chemistry*, v. 30, May 1958, p. 885-891.

10773* Compensating Saturation in Feedback Control Systems by Excess Error Storage. S. S. L. Chang and R. W. Archbald. *Applications and Industry*, 1958, no. 35, Mar., 16-20.

Method for improving the operation of a system subjected to transient saturation. The excess error signal above saturation was stored and used to prolong the error signal at its maximum value.

10774 SADSAC: A Sampled-Data Simulator and Computer Using Stepping Relays. Gilbert S. Stubbs. *Automatic Control*, v. 8, no. 4, Apr. 1958, p. 47-50.

"SADSAC" computer permits a more extensive and more accurate simulation of complex, distributed-parameter systems than is presently possible with conventional analog facilities.

10775 Procedures for Evaluating Dynamic Characteristics of Valve Actuators. Andrew Bremer. *Automatic Control*, v. 8, no. 5, May 1958, p. 7-10.

Gives details of test procedure.

10776 The Design and Application of Correlation Control. A. B. Chelustkin. *Automatic Control*, v. 8, no. 5, May 1958, p. 16-18.

Shows how correlation computing devices are used with feedforward and feedback loops to produce systems with adaptive properties.

10777* Tape Controlled Transfer Machine Handles Different Parts Simultaneously. *Automation*, v. 5, June 1958, p. 34-39.

Applied to small lot production runs.

10778* Applying Infrared Analyzers to Control Furnace Atmospheres. J. L. Garrison. *Automation*, v. 5, June 1958, p. 46-48.

Control of heat-treat furnace atmosphere results in lower costs, less scrap, and predictable machining properties.

10779* Strip Mill Uses Automatic Programmed Control. E. H. Browning. *Automation*, v. 5, June 1958, p. 64-67.

Applies where desired operations can be translated into numerical values, and equipment response can be controlled and monitored by electrical means.

10780* (Russian.) Logical Elements for Cybernetic Systems of Automatic Control. **Elementy logicheskogo deistviia dlia prostykh releinykh kiberneticheskikh sistem.** A. G. Ivakhnenko. *Avtomatika*, 1957, no. 4, p. 48-51.

10781* (Russian.) On the Application of a Rectangular Disturbance for Determining Frequency Responses of Automatic Control Systems. **Pro zastosuvannia priamokutnogo zburennia pri viznachenni amplitudno-fazovikh kharakteristik sistem avtomatichnogo reguliuvannia.** P. I. Dekhtiarenko. *Avtomatika*, 1957, no. 4, p. 106-109.

10782* Solving Spiral Bridge Geometrics by Computer. Jack Belzer. *Civil Engineering*, v. 28, no. 5, May 1958, p. 52-54.

Details the basic geometric problem of the intersection of a straight line with a spiral curve which was determined in the past by the use of handbook tables empirically obtained. The example presented shows how this work can be done by computers such as the IBM 650 system.

10783 Digital and Pictorial Photographic Electronic Recorder. R. G. McPherson and I. A. Sonderby. *Communication and Electronics*, 1958, no. 36, May, p. 194-196.

A film data-recording system is described which combines pictorial and digital recording.

10784* A Component Case History: Information Storage Devices: A Key to Automation. I-II. Richard J. Bengston and Joseph E. Smith, Jr. *Computers and Automation*, v. 7, Apr. 1958, p. 11-13; May 1958, p. 14-15.

The development of information storage devices is reviewed and the market for electronic data processing is analyzed. The major criteria for such devices are access time, capacity, reliability, cost, sensitivity to environmental factors, and permanence. Compares magnetic core, magnetic drum, magnetic disc, and magnetic tape memory systems among some 20 schemes mentioned. Tape is the cheapest, but magnetic core systems have the shortest access time.

10785* The Special Purpose Computer ERMA for Handling Commercial Bank Checking Accounts. I. *Computers and Automation*, v. 7, May 1958, p. 20-22.

10786 Dual-Mode Servo Compensation. Dietrich K. Gehmlich. *Control Engineering*, v. 5, May 1958, p. 119-123.

A form of nonlinear compensation that may improve response by up to 400% in systems involving rapidly changing inputs.

10787 Control Engineering Manual. Byron K. Ledgerwood, editor. 189 pp. 1957. McGraw-Hill, New York. (TA165 C76c Over.)

A guide to the practice of control systems engineering, including system specification, synthesis, and evaluation, plus a comprehensive coverage of design techniques and equipment important to automatic control.

10788 Photoformer Solves Sound Barrier Problems. Robert W. Maloy. *Electronics* (Engineering Edition), v. 31, no. 21, May 23, 1958, p. 78-80.

Photoelectric function generator provides smooth reproduction of complex curves for use in simulating analog computer problems.

10789* ETL Mark III, a Transistor Digital Automatic Computer. S. Takahashi, H. Nishino, I. Matsuzaki, and K. Kondo. *ETJ of Japan*, v. 3, no. 4, Dec. 1957, p. 143-147.

Device followed EDSAC in its system design.

10790* The Design of the Control Unit of an Electronic Digital Computer. M. V. Wilkes, W. Renwick, and D. J. Wheeler. *Institution of Electrical Engineers, Proceedings*, v. 105, pt. B, no. 20, Mar. 1958, p. 121-128.

The control unit provides the sequences of pulses, which, when applied to the store, arithmetic unit and other units of the machine, cause the orders of the program to be executed.

10791* A Decimal Adder Using a Stored Addition Table. M. A. Maclean and D. Aspinall. *Institution of Electrical Engineers, Proceedings*, v. 105, pt. B, no. 20, Mar. 1958, p. 129-135.

Accepts numbers in binary-coded form.

10792* A Punched Tape Programmed Automatic Control System. *Instrument Practice*, v. 12, Apr. 1958, p. 368-372.

Operates a complex chemical manufacturing process.

10793 *IRE Transactions on Electronic Computers*, v. EC-7, no. 1, Mar. 1958, 70 pp. (TK1 In6.6e Vis.)

Consists of 13 papers on various phases of logic circuitry, differential analyzer error, scanners, transistorized time-division multiplier, function generator, switching circuits, thermistors, and a review of 1957.

10794 A Semidigital Process Simulator. M. Terao and K. Tamura. *IRE Transactions on Instrumentation*, v. I-7, no. 1, Mar. 1958, p. 18-22. (TK1 In6.6i Vis.)

Device offers a new aid for the synthesis of control systems.

10795 Nondestructive Memory Employing a Domain Oriented Steel Wire. U. F. Gianola. *Journal of Applied Physics*, v. 29, May 1958, p. 849-853.

A magnetic memory, as above, can be interrogated by applying a perturbing field normal to the direction of remanent magnetization, and, at the same time, observing the sign of the reversible flux change.

10796 1957 Proceedings of the Instrument Society of America, 12th Annual Conference. 221 pp. 1957. Instrument Society of America, Pittsburgh. (Q184 In7p Vis.)

A compilation of 29 papers relating instrumentation and systems engineering.

10797* Random Walks With Restraining Barrier as Applied to the Biased Binary Counter. R. E. Fagen and T. A. Lehrer. *Society for Industrial and Applied Mathematics, Journal*, v. 6, no. 1, Mar. 1958, p. 1-14.

Necessity of using counters as a continuous check on the production of binary streams.

10798 Slit Servo for Single-Beam Spectrometer. Woodfin E. Shuler. *U. S. Atomic Energy Commission, DP-274*, Mar. 1958, 10 pp. (UF767 Un3.1dp Contin.)

A servomechanism has been designed and constructed that adjusts automatically the slit width to yield a base line of constant signal.

See also: **10312** (infrared missile guidance); **10448** (process control equipment); **10456** (dynamic fractionator analysis); **10460** (computer solution of adsorption problems); **10480** (computer program for emission spectral data); **11187** (automatic heating and quenching); **11561** (automated welding).

ELECTRICAL ENGINEERING

10799* (Russian.) A Method for the Synthesis of Multipole Contact Circuits. **Metod sinteza mnogopoliusnykh kontaktnykh skhem.** V. N. Grebenshchikov. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 278-281.

10800* (Russian.) Effect of Admixtures on Electrical Properties of Rutile. **Vliianie primesei na elektricheskie svoistva rutila.** Ia. M. Ksendzov. *Akademiia Nauk SSSR, Seriia Fizicheskaia*, v. 22, no. 3, Mar. 1958, p. 237-248.

10801* (Russian.) Dielectric Losses in Muscovite Mica With Mineral Inclusions of Limonite and Biotite at H.F. **Dielektricheskie poteri v sliude muskovite s mineralogicheskimi vkliucheniiami limonita i biotita na vysokoi chastote.** K. A. Vodop'ianov and I. G. Vorozhtsova. *Akademiia Nauk SSSR, Seriia Fizicheskaia*, v. 22, no. 3, Mar. 1958, p. 283-287.

10802* (Russian.) Dielectric Permeability of NaCl at Higher Temperatures. **Dielektricheskaia pronitsaemost' kamennoi soli pri vysokikh temperaturakh.** M. S. Kosman and N. A. Petrova. *Akademiia Nauk SSSR, Seriia Fizicheskaia*, v. 22, no. 3, Mar. 1958, p. 311-314.

10803 Annual Report, 1957. Conference on Electrical Insulation of the Division of Engineering and Industrial Research. 70 pp. 1958. National Academy of Sciences, Washington, D. C. (TK3401 N21a Vis.)

The 16 papers deal with dielectric breakdown, thermal and radiation degradation, tracking, and other electrical behavior of dielectrics.

10804* The Electromagetic Pumping of Liquid Metals. II. J. A. S. Hilditch. *Atomics* (British), v. 9, no. 4, Apr. 1958, p. 125 + 3 pages.

The a.c. conduction pump; induction pump.

10805* The Design of Very Large Turbo-Alternators. E. Wiedemann. *Brown Boveri Review*, v. 45, no. 1, Jan. 1958, p. 3-13.

Describes a 260-MVA turbo-alternator built on lines similar to those which would be used for a 500-MVA machine.

10806 Watt-Hour Meter for Two Phases of a 4-Wire Y 3-Phase System. A. M. McQuarrie. *Communication and Electronics*, 1958, no. 36, May, p. 152-156.

10807 Magnetic-Amplifier Design. I. The Core. II. The Windings. R. E. Anderson. *Communication and Electronics*, 1958, no. 36, May, p. 160-175.

Design of the toroidal magnetic amplifier.

10808 An Experimental Study of Magnetic Materials for Use in Ultrahigh-Temperature Electronic Transformers. H. B. Harms. *Communication and Electronics*, 1958, no. 36, May, p. 181-184.

Results in temperatures up to 500 C are studied.

10809 Airborne Teletypewriter AN/AGC-1. Richard A. Michals. *Communication and Electronics*, 1958, no. 36, May, p. 234-239.

Presents the results of the developments leading to the design of this teletypewriter.

10810* (French.) The Evolution of the Electric Resistance of Thin Cobalt Layers. **Évolution de la résistance électrique des lames minces de cobalt.** France Savornin. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 15, Apr. 14, 1958, p. 2230-2233.

Thin sheets of Co deposited by vaporization in vacuum on glass at 175 C evinced a spontaneous evaluation differing from that of layers deposited on support at room temperature. Coefficient of temperature was positive. Thickness was between 2 and 21 mμ.

10811 (German.) Dielectric Properties of the Barium-Strontium-Lanthanum-Titanate System. **Die dielektrischen Eigenschaften des Systems Barium-Strontium-Lanthan-Titanat.** J. Kainz. *Deutschen Keramischen Gesellschaft, Berichte*, v. 35, no. 3, Mar. 1958, p. 69-77.

A study of the relationship between temperature and frequency on one hand, and the dielectric constant and the phase angle on the other.

10812* Multilayer Conductor Having Low Resistance at High Frequencies. Masao Sugi and Kaoru Murai. *Electrical Engineering*, v. 34, no. 4, Dec. 1957, p. 332-336.

New conductor designs are studied.

10813* (Russian.) Comparative Economic Appraisal of A. C. and D. C. Long-Distance Transmission. **Sravnitel'naia ekonomicheskaia otsenka dal'nikh peredach postoiannogo i peremennogo toka.** A. I. Gershengorn, S. S. Rokotian, and P. E. Sandler. *Elektrichestvo*, 1958, no. 5, May, p. 8-11.

10814* (German.) An Up-to-Date Review on Insulating Oils for Transformers. **Aktuelle Betrachtungen über Isolieröle für Transformatoren.** F. O. Skala. *Elektrotechnik und Maschinenbau*, v. 75, no. 7, Apr. 1, 1958, p. 137-140.

Oxidation of transformer oils by atmospheric oxygen. Stability of transformer oils.

10815* General Method of Analyzing Bilateral, Two-Port Networks From Three Arbitrary Impedance Measurements. E. Folke Bolinder. *Ericsson Technics*, v. 14, no. 1, 1958, p. 3-37.

10816* Parallel Type Spark-Quenching Circuit for Relay Contacts Interrupting D. C. Circuit. S. Hoh, A. Oyama, and S. Mitani. *ETJ of Japan*, v. 3, no. 4, Dec. 1957, p. 117-121.

10817* A New Method for Equivalent Testing of A. C. Circuit Breakers. T. Ushio and T. Ito. *ETJ of Japan*, v. 3, no. 4, Dec. 1957, p. 139-142.

A modified "Weil circuit" by adopting d.c. source as a high current source is used.

10818* (German.) Silicon Rectifier With Adjustable Transformer as Compared With the Ward-Leonard Converter. **Siliziumgleichrichter mit regelbarem Transformator im Vergleich zum Leonardumformer.** Friedrich Stier and Helmut Blessing. *ETZ: Elektrotechnische Zeitschrift*, v. 79, Ausgabe A, no. 8, Apr. 11, 1958, p. 280-282.

10819* (German.) Epoxide Resins and Their Use in Electrical Engineering. **Epoxydharze und ihre Verwendung in der Elektrotechnik.** Paul Nowak and Friedjof Weber. *ETZ: Elektrotechnische Zeitschrift*, v. 10, Ausgabe B, no. 4, Apr. 1958, p. 101-107.

Definition of epoxide resin. Characteristics of hardeners; properties of hardened resins. Use in high-tension apparatus. Impregnation and adhesive resins for conductor insulation. Bonding agent for laminated material.

10820* The Measurement of High Voltages With Indicating or Recording Instruments. G. W. Bowdler. *Institution of Electrical Engineers, Proceedings*, v. 105, pt. A, no. 20, Apr. 1958, p. 176-184.

Accuracy is within about 1%.

10821* The Thermal Properties of High-Voltage Insulants. P. H. G. Allen. *Institution of Electrical Engineers, Proceedings*, v. 105, pt. C, no. 7, Mar. 1958, p. 35-45.

Transient methods for the determination of the thermal diffusivity of solids and thermal conductivity of fluids are described, with examples and an estimate of their accuracy.

10822* Generalized Operators for the Approximate Steady-State Analysis of Linear and Non-Linear Circuits. A. J. O. Cruickshank. *Institution of Electrical Engineers, Proceedings*, v. 105, pt. C, no. 7, Mar. 1958, p. 76-87.

A periodic analogue of the technique of time series.

10823 Irregular Lines by Standard Teletype. John Brown. *IRE Transactions on Instrumentation*, v. I-7, no. 1, Mar. 1958, p. 38-43. (TK1 In6.6i Vis.)

System of converting analog-line information to digital form permits transmission of all military map information by standard teletype.

10824* (German.) Investigations on the Temperature Coefficient of the Initial Permeability in Powder Core Materials. **Untersuchungen über den Temperaturkoeffizienten der Anfangspermeabilität von Pulverkernwerkstoffen.** H. Henniger. *Nachrichtentechnik*, v. 8, no. 2, Feb. 1958, p. 66-75.

10825* (English.) **On a New Method in the Theory of Superconductivity.** N. N. Bogoljubov. *Nuovo Cimento*, v. 7, ser. 10, no. 6, Mar. 16, 1958, p. 794-805.

A theory developed for the study of superfluidity is extended to cover the superconductive state. It is shown that the original Fröhlich model possesses the property of superconductivity. The ground state and its fermion excitations are considered.

10826* (English.) **Comments on the Theory of Superconductivity.** J. G. Valatin. *Nuovo Cimento*, v. 7, ser. 10, no. 6, Mar. 16, 1958, p. 843-857.

Collective fermion variables. Structure of the excitation spectrum. The temperature dependent phenomena and its relationship to the grand canonical ensemble.

10827 Permanent Magnet Handbook. Earl M. Underhill, editor. Sections individually paged. 1957. Crucible Steel Company of America, Pittsburgh. (QC757 P42)

Consists of 12 sections on magnet theory, design, and practice.

10828* (French.) On Certain Properties of the Current Spectrum in Electrical Circuits With Variable Inductance. **Sur certaines propriétés du spectre de courants dans les circuits électriques à inductance variable.** Matei Marinescu and M. Popov. *Revue d'Électrotechnique et d'Énergétique*, v. 1, no. 2, 1956, p. 15-32.

Solution of an infinite system of equations connected with a new type of impedance. Energy relationships of the current spectrum, asynchronous mechanical work. Energy discontinuities. Synchronous work.

10829 Switchgear Principles. P. H. G. Crane. 238 pp. 1957. Cleaver-Hume Press, London. (TK2821 C85s)

Provides single source information for the student on switchgear which has, up to now, been rather scattered.

10830* (Russian.) Comparative Analysis of Various Methods for Measuring Density of the Current Flowing From Subterranean Cable Sheaths. **Sravnitel'nyi analiz sposobov izmereniia plotnosti toka, stekaiushchego s obolochek podzemnykh kabelei.** V. M. Bushuev. *Vestnik Sviazi*, v. 18, no. 5, May 1958, p. 30-31.

10831* (Russian.) Regularities of the Electrical Breakdown of Ultra-Porcelain at Impulse Voltage. **Zakonomernosti elektricheskogo proboia ul'trafarfora pri impul'snom napriazhenii.** I. E. Balygin. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 4, Apr. 1958, p. 767-773.

See also: **10416** (dielectric properties of $BaTiO_3$); **10430** (lead alumino silicate ceramics); **10884** (oxide cathodes); **11019** (thermo-electron engine); **11046** (electrodynamometer); **11349** (economics of atomic power); **11456** (electrical principles); **11470** (electrical properties of metal silicides); **11498** (dielectric properties of polymers).

ELECTROCHEMISTRY

10832* (Italian.) The Control of Aluminum Anodic Coatings. **Controllo dei rivestimenti anodici sull'alluminio.** A. Prati. *Alluminio*, v. 27, no. 4, Apr. 1958, p. 165-172.

Methods are reviewed with the indication for each of them of limit values to be adopted for the control of oxidized material.

10833* Direct Electrolysis of Nickel Matte. *Canadian Chemical Processing*, v. 42, Apr. 1958, p. 72 + 4 pages.

A flowsheet for electrolytic Ni from sulfide anodes is given. Process permits recovery of elemental S and Se.

10834* (German.) Electrolytic Production of Magnesium. **Elektrolytische Darstellung von Magnesium.** Gerhard Born. *Chemische Technik*, v. 10, no. 3, Mar. 1958, p. 137-144.

Raw material and methods used. Electrolysis of anhydrous $MgCl_2$: the electrolyte, bath, electrical energy, potential difference, thermal losses through the bath, side walls, anodes, and cathodes. Enthalpy of $MgCl_2$.

10835 The Protective Value of Tin-Nickel Alloy Deposits on Steel. F. A. Lowenheim, W. W. Sellers, and F. X. Carlin. *Electrochemical Society, Journal*, v. 105, June 1958, p. 338-346.

Outdoor exposure tests of the comparative value of the Sn-Ni alloy and conventional Ni/Cr deposits on steel, with and without a Cu undercoat, are reported. It is shown that Sn-Ni is comparable in protective value to Ni/Cr, not quite so good in marine but superior in industrial atmospheres. In general, the protective value of the Sn-Ni deposit is of a high order.

10836 The Preparation of Uranium Metal by the Electrolytic Reduction of Its Oxides. L. W. Niedrach and B. E. Dearing. *Electrochemical Society, Journal*, v. 105, June 1958, p. 353-358.

Unlike past electrolytic processes for uranium production, the one presented is operated at temperatures which are above the melting point of the metal. The effect of current, salt bath composition, and other variables on efficiency and cell operation are discussed.

10837 Determination of the Faradaic Impedance at Solid Electrodes and the Electrodeposition of Copper. J. O'M. Bockris and B. E. Conway. *Journal of Chemical Physics*, v. 28, Apr. 1958, p. 707-716.

10838 Electrode Potentials in Fused Systems. IV. A Thermodynamic and Kinetic Study of the AgCl-NaCl System. Kurt H. Stern. *Journal of Physical Chemistry*, v. 62, Apr. 1958, p. 385-390.

The cell Ag/AgCl, NaCl/Cl_2 was studied over the complete concentration range from pure AgCl to pure NaCl between 750 and 900 C.

10839 Factors Affecting Residual Stress in Electrodeposited Metals. A Critical Evaluation. II. Joseph B. Kushner. *Metal Finishing*, v. 56, May 1958, p. 82-87.

Effects of the cathode film, temperature, current density, contaminants, and addition agents. (To be continued.)

10840* (French.) Electropolishing of Carbon Steel and of Low Alloyed Steel in Molten Salts. Display of the Structure and of the Real Austenite Grain. **Polissage électrolytique des aciers au carbone et des aciers faiblement alliés en sels fondus. Mise en évidence de la structure et du grain réel d'austénite.** Zygmunt Woljcik. *Métaux. Corrosion-Industries*, v. 33, no. 390, Feb. 1958, p. 53-70.

Different methods used to reveal the austenite structure. Surface phenomena causing difficulties at times. Advantages of electropolishing applied to steel in the stable austenitic state. Anodic dissolution of steel in molten salts and the polycrystalline structure of austenite.

10841 Alkaline Nickel Plating. Edward B. Saubestre. *Plating*, v. 45, May 1958, p. 479-485.

Equilibrium data for various complexing agents are used to calculate deposition potentials for Ni. Polyphosphates and ammonia are suitable inorganic complexing agents, while dibasic carboxylic acids, α-hydroxy carboxylic acids, α-amino acids, and amines are suitable organic complexing agents.

10842 Research on Microthrowing Power and Leveling of Plating Baths. Ernst Raub. *Plating*, v. 45, May 1958, p. 486-492.

Investigations on the Ni and Cu plating of various macro- and microprofiles on brass panels.

10843 Magnesium and Protective Coatings for Magnesium. Harry A. Evangelides. *Plating*, v. 45, May 1958, p. 493-498.

History of the production of Mg; behavior of Mg alloys in corrosive atmospheres; types of corrosion; new electrolytic coatings; post treatments.

10844* (German.) New Results of the Electrochemistry of Non-Aqueous Solutions. Conductivities and Adjustments of Potential. **Neuere Ergebnisse der Elektrochemie nichtwässriger Lösungen. Über Leitfähigkeiten und Potentialeinstellungen.** L. Fischer, G. Winkler, and G. Jander. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für Physikalische Chemie*, v. 62, no. 1, 1958, p. 1-28.

Conductivity of non-associated electrolytes. Semi-empirical conductivity formulas. Dissociation constants of associated electrolytes. Methods to determine the degree and constants of dissociation of associated electrolytes. Potentiometric titrations.

10845* (German.) Electrolytic Solution of Gold-Silver Alloys and the Problem of the Limits of Resistance. **Elektrolytische Auflösung von Gold-Silber-Legierungen und die Frage der Resistenzgrenzen.** Ragnar P. Tischer and Heinz Gerischer. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für Physikalische Chemie*, v. 62, no. 1, 1958, p. 50-60.

Study of limits of resistance in metallic mixed crystals. Anodic current-voltage curves of Au-Ag alloys and non-steady phenomena in electrolytes. Increase of the potential with increase of the Au-content. Protective effect of oxide layers of Au.

10846* (Russian.) Effect of Surface-Active Substances on the Mechanical Properties of Electrolytic Deposits. **Vliianie poverkhnostno-aktivnykh veshchestv na mekhanicheskie svoistva elektroliticheskikh osadkov.** N. P. Fedot'ev and Iu. M. Pozin. *Zhurnal Prikladnoĭ Khimii*, v. 31, no. 3, Mar. 1958, p. 419-424.

See also: **10702** (electrolytic solutions); **10759** (corrosion resistant metal coatings).

ELECTRONICS

10847* (Russian.) Determination of E.M.F. and Resistance of Selemium Rectifiers Exposed to Radiation. **Opredelenie EDS i soprotivleniia selenovykh vypriamliaiushchikh elementov, nakhodiashchikhsia pod deistviem izlucheniia.** M. A. Talibi and G. B. Abdullaev. *Akademiia Nauk Azerbaidzhanskoi SSR, Doklady*, v. 14, no. 1, 1958, p. 3-7.

Study of the relation between the e.m.f. and resistance and the intensity of γ-, x-, and visible radiation.

10848* (Russian.) Latitudinal and Longitudinal Galvanomagnetic Effect of an n-Type Germanium Single Crystal. **Issledovanie prodol'nogo i poperechnogo gal'vanomagnitnogo effektov na n-tipa monokristalle germaniia.** R. G. Annaev and A. Allanazarov. *Akademiia Nauk Turkmenskoi SSR, Izvestiia*, 1958, no. 1, p. 87-90.

The initial conductivity and the galvanomagnetic effect as factors of the crystallographic orientation of the monocrystal. The presence of anisotropy in relation to galvanomagnetic effect.

10849* (German.) Linearizing the Frequency Modulation Characteristic of a Reflex Klystron. **Die Linearisierung der Frequenzmodulations - Kennlinie eines Reflexklystrons.** Eberhard Schuon and Hans-Jürgen Butterweck. *Archiv der Elektrischen Übertragung*, v. 12, no. 3, Mar. 1958, p. 99-108.

Frequency modulation by superimposing the modulating voltage onto the reflector direct potential of the reflector electrode. Curvature of the modulating characteristic gives the limits of the range that can be utilized.

10850 Ways of Improving the Efficiency of Semiconductor Thermocouples. A. F. Ioffe, S. V. Airapetyants, A. V. Ioffe, N. V. Kolomoets, and L. S. Stil'bans. *Henry Brutcher Translation No.* 4075, 4 pp. (From *Doklady Akademii Nauk SSSR*, v. 106, no. 6, 1956, p. 981.) Henry Brutcher, Altadena, Calif.

A way of increasing the ratio of carrier density to thermal conductivity of the crystal lattice of thermocouple materials.

10851 The Electrical Breakdown of Small Gaps in Vacuum. A. S. Denholm. *Canadian Journal of Physics*, v. 36, Apr. 1958, p. 476-493 + 1 plate.

Investigation of gaps subject to contamination by diffusion pump oil showed that the most consistent results were obtained when electrodes were conditioned by a H discharge. Time for which voltage was applied to the vacuum gap influenced the breakdown voltage.

10852 Magnetoresistance and Field Dependence of the Hall Effect in Indium Antimonide. Gaston Fischer and D. K. C. MacDonald. *Canadian Journal of Physics*, v. 36, May 1958, p. 527-538.

10853 A Theoretical Rate-Amplitude Relation in Meteoric Forward-Scattering. C. O. Hines. *Canadian Journal of Physics*, v. 36, May 1958, p. 539-554.

Develops a relation which expresses the anticipated occurrence rate of scattered signals which exceed a chosen amplitude level, as a function of that level.

10854 Failure-Rate Studies on Silicon Rectifiers. N. F. Bechtold and C. L. Hanks. *Communication and Electronics*, 1958, no. 35, Mar., p. 49-56.

Operating life capabilities of low-power Si rectifiers are discussed to acquaint systems application engineers with the unexpectedly high failure rates and related reliability factors demonstrated in a testing program aimed at evaluating these devices for stringent military application requirements.

10855 An Amplitude-Stabilized Bridged-T Oscillator. Kurt Enslein. *Communication and Electronics*, 1958, no. 35, Mar., p. 75-79.

10856 Wide-Band Ultrahigh-Frequency Over-the-Horizon Equipment. R. A. Felsenheld, et al. *Communication and Electronics*, 1958, no. 35, Mar., p. 86-93.

Radio equipment in the 680- to 900-mc band suitable for use in toll-quality multichannel telephone or TV circuits is described.

10857 A Stabilized D-C Differential Transistor Amplifier. Louis Depian and Richard E. Smith. *Communication and Electronics*, 1958, no. 36, May, p. 157-159.

Reliable temperature-stable, d.c. transistor amplifiers can be built with differential amplifiers.

10858* (French.) Absorption of Light Through Electron-Hole Pairs Liberated Photoelectrically in a Germanium Single Crystal. **Absorption de la lumière par les électron-trou libérées par effet photoélectrique dans un monocristal de germanium.** François Desvignes. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 12, Mar. 24, 1958, p. 1824-1827.

Experiment shows that the factor of transmission of a semiconductor, with wavelengths greater than that of the photoelectric threshold can be modulated by the absorption due to charges liberated by the photoelectrical effect.

10859* (English.) **The Resolution of Photo-Multipliers in Scintillation Spectrometers.** Jiří Kopecký and Josef Kajfosz. *Czechoslovak Journal of Physics*, v. 8, no. 2, 1958, p. 171-180.

A method for separately judging the individual factors affecting resolution is discussed.

10860* (English.) **The Effect of the Irradiation of Germanium With α-Particles on the Recombination of Current Carriers.** Gerhard Dorda. *Czechoslovak Journal of Physics*, v. 8, no. 2, 1958, p. 181-185.

Evaluation showed position of energy level of recombination center produced by irradiation lies near upper edge of valence band or lower edge of conduction band.

10861* Rating of Thermionic Valves for Use Under Abnormal Ambient Conditions. Bernard D. Mills and Walter W. Wright. *Electrical Communication*, v. 34, no. 4, Dec. 1957, p. 322-331.

10862 A Reliability Handbook for Design Engineers. F. E. Dreste. *Electrical Engineering*, v. 77, June 1958, p. 508-512.

Discusses a reliability handbook which has been specially prepared to aid guided missile electronics design engineers. The major section of the handbook explains methods for designing reliability into equipment by the adherence to certain "ground rules". Emphasis is placed on the use of statistical techniques.

10863 Plastics and Ceramic Foams for Electronic Applications. William R. Cuming and Philip M. Andress. *Electrical Manufacturing*, v. 61, May 1958, p. 100-104.

Combination of light weight and excellent dielectric properties has opened up an increasing area of application for plastics and ceramic foam materials in electronic equipment design. Various types of foams are discussed and application methods are described. Property data are included for typical compounds. Selected case histories are illustrated.

10864 Magnetic Pulse Generators. J. E. Sunderlin and M. L. Weinberg. *Electrical Manufacturing*, v. 61, May 1958, p. 139-143.

Pulse generators using saturable reactors as switches overcome power limitations of thyratrons in radar applications. The general circuit principles and pulse forming network design discussed apply to pulse generating systems such as an ignitron firing circuit.

10865 Designing Multiple Feedback Loops. I. Franklin H. Blecher. *Electronic Industries*, v. 17, Apr. 1958, p. 78-82.

A criterion of stability is derived for calculating the stability margins of multiple loop circuits. It is directly applicable to vacuum tubes and to junction transistors in certain configurations. (To be continued.)

10866 Ring-Modulator Reads Low-Level DC. Edward J. Keonjian and John D. Schmidt. *Electronic Industries*, v. 17, Apr. 1958, p. 86-89.

By using high-quality silicon diodes in a ring-modulator circuit, DC signals as low as 10^{-10} amp. can be measured. Combined with a logarithmic attenuator, the output can be made a logarithmic function of the input from 10^{-10} to 10^{-3} amp.

10867 Reliability of Multi-Moded Systems. Herbert I. Zagor, Kenneth Curtin, and Harold Greenberg. *Electronic Industries*, v. 17, Apr. 1958, p. 101 + 5 pages.

Method for computing reliability. Application to a hypothetical multi-moded fire control system.

10868 Ferrite Radiators Shrink Missile Antenna Systems. H. C. Hanks, Jr. *Electronics* (Engineering Edition), v. 31, no. 17, Apr. 25, 1958, p. 49-51.

Procedure for predicting approximate radiation pattern for ferrite elements in a microwave antenna system uses random-balance technique. Directivity property of ferrite elements permits ferrite arrays to provide half-power beam widths and side-lobe characteristics.

10869 Ceramic I-F Filters Match Transistors. Daniel Elders and Emanuel Gikow. *Electronics* (Engineering Edition), v. 31, no. 17, Apr. 25, 1958, p. 59-61.

Barium titanate resonant filters used as i-f transformers provide reductions in size and cost with increased ruggedness, better skirt selectivity, and lower insertion loss.

10870 The Solid-State Maser—A Supercooled Amplifier. J. W. Meyer. *Electronics* (Engineering Edition), v. 31, no. 17, Apr. 25, 1958, p. 66-71.

Experimental amplifiers in the S-band (2,800 mc), L-band (1,400 mc) and uhf (300 mc) regions exhibit extremely low self-generated noise.

10871 Airborne Tv System for Military Reconnaissance. Nisson Sher and Joseph F. Fisher. *Electronics* (Engineering Edition), v. 31, no. 21, May 23, 1958, p. 66-70.

May be transmitted to ground or surface-vessel installations within 50-mile line-of-sight range by 30-w transmitter operating in 780 to 900-mc frequency band.

10872 Automatic Speech Amplitude Control. Lyle R. Battersby. *Electronics* (Engineering Edition), v. 31, no. 21, May 23, 1958, p. 71-73.

Increases amount of intelligence transmitted over radio communication system under adverse conditions by altering energy distribution of speech.

10873 Transistor A-C Amplifier Uses Multiple Feedback. Howard Lefkowitz. *Electronics* (Engineering Edition), v. 31, no. 21, May 23, 1958, p. 84-85.

10874* (Russian.) Break Through in Vacuum. **Proboi v vakuume.** V. N. Glazunov. *Elektrichestvo*, 1958, no. 3, Mar., p. 40-44.

Emission of electrons from metals. Coefficients of the emission equations. Break through in the case of conditioned and non-conditioned electrodes.

10875* (Russian.) Surface Resistance of Semiconductors. **O poverkhnostnom soprotiolenii dielektrikov.** A. P. Geppe. *Elektrichestvo*, 1958, no. 3, Mar., p. 60-65.

Determination of resistance of surfaces coated and uncoated with a film of higher conductivity.

10876* The Encyclopaedia of Radio and Television. 2nd Ed. 736 pp. 1958. Philosophical Library, New York. (TK6544 En19r2 Ref.)

Alphabetical reference to various aspects of communication technology.

10877* Microwave Ferrites. B. Josephson and P. E. Ljung. *Ericsson Technics*, v. 14, no. 1, 1958, p. 39-70.

Structure, dielectric, and magnetic properties. Physical phenomena as basis for applications at microwave lengths.

10878* On the Measurement of Permittivity and Tensor Permeability of Thin Ferrite Rods. N. Ogasawara. *ETJ of Japan*, v. 3, no. 4, Dec. 1957, p. 126-130.

Useful methods of determining all constants of the magnetized ferrites by employing a rod sample.

10879* On the A. C. Bias of Magnetic Recording. K. Nagai, S. Iwasaki, and K. Yokoyama. *ETJ of Japan*, v. 3, no. 4, Dec. 1957, p. 131-135.

Permeation of magnetization caused by a.c. bias field verified using tapes of various thickness.

10880* (German.) A Double Oscillator With Strong Special Harmonics for the Multiplication and Division of Frequencies. **Ein Doppeloszillator mit starken speziellen Oberwellen für Vervielfachung und Teilung von Frequenzen.** Gerhard Becker. *Frequenz*, v. 12, no. 4, Apr. 1958, p. 97-103.

Description of oscillators capable of producing very high harmonics of the fundamental frequency and of being used as frequency dividers according to the principle of forced oscillation range. Performance was explained by means of oscillographic recording.

10881* Radio Observations on the Russian Satellites. *Institution of Electrical Engineers, Proceedings*, v. 105, pt. B, no. 20, Mar. 1958, p. 81-115.

A meeting where ten papers were presented, describing the part played by radio in observing the behavior of the satellites.

10882* The Application of Printed-Circuit Techniques to the Design of Microwave Components. J. M. C. Dukes. *Institution of Electrical Engineers, Proceedings*, v. 105, pt. B, no. 20, Mar. 1958, p. 155-172.

10883* An Instrument for the Measurement of Surface Impedance at Microwave Frequencies. A. E. Karbowiak. *Institution of Electrical Engineers, Proceedings*, v. 105, pt. B, no. 20, Mar. 1958, p. 195-203.

A theory is given for the above.

10884* The Conductivity of Oxide Cathodes. III. Movements of Electrolytic Oxygen in a Conventional Diode System. IV. Electron Transfer Mechanisms. G. H. Metson. *Institution of Electrical Engineers, Proceedings*, v. 105, pt. C, no. 7, Mar. 1958, p. 183-195.

10885 Temperature Limits, Ratings, and Natural Cooling Procedures for Avionic Equipment and Parts. James P. Welsh. *IRE Transactions on Aeronautical and Navigational Electronics*, v. ANE-5, no. 1, Mar. 1958, p. 15-24. (TK1 In6.6a Vis.)

10886 An Evaporative-Gravity Technique for Airborne Equipment Cooling. M. Mark, M. Stephenson, and C. Goltsos. *IRE Transactions on Aeronautical and Navigational Electronics*, v. ANE-5, no. 1, Mar. 1958, p. 47-52. (TK1 In6.6a Vis.)

10887 The Gaussian Curse-Transmitter Noise Limits Spectrum Utilization. Neal H. Shepherd and Jared Scott Smith. *IRE Transactions on Vehicular Communications, PGVC-10*, Apr. 1958, p. 27-32. (TK1 In6.6v Vis.)

An absolute method of measurement of transmitter noise spectrum amplitude is described and the effects of noise in terms of required physical and frequency spacing is shown.

10888 Characteristics of Junctions in Germanium. N. J. Harrick. *Journal of Applied Physics*, v. 29, May 1958, p. 764-770.

Infrared radiation has been used to obtain a direct measure of the added carrier concentrations immediately adjacent to a junction when a current was passing through it.

10889* The Transverse Magnetoresistance Effect in Indium Antimonide. C. H. Champness. *Journal of Electronics and Control*, v. 4, no. 3, Mar. 1958, p. 201-218.

Magnetoresistance at liquid air temperature is larger than expected.

10890* A High Frequency Germanium Drift Transistor by Post Alloy Diffusion. J. S. Lamming. *Journal of Electronics and Control*, v. 4, no. 3, Mar. 1958, p. 227-236.

A new solid state diffusion technique was used to produce a Ge drift transistor with a cut-off frequency in excess of 200 Mc/s, low collector capacitance, and small base resistance.

10891* Circuit Analogues of Suhl-Type Masers. K. W. H. Stevens. *Journal of Electronics and Control*, v. 4, no. 3, Mar. 1958, p. 275-279.

Analysis of the electrical properties of two arrangements involving tuned circuits, into which energy can be fed by varying inductances with time.

10892* (French.) Properties of the Semi-Conductor InSb. **Propriétés du semi-conducteur InSb.** Michel Rodot. *Journal de Physique et le Radium*, v. 19, no. 2, Feb. 1958, p. 140-150.

Uncertainty concerning the exact value of the electron effective mass and the mechanism of scattering of the electrons. Theory of thermoelectric and thermomagnetic effects in InSb. Scattering by the optical lattice vibrations is the predominant mechanism.

10893 Modular Packaging of Transistorized Circuit Assemblies. A. A. Lawson and J. D. Svedlow. *Machine Design*, v. 30, May 1, 1958, p. 114-122.

Fundamentals of a design approach to functional electronic circuit development based upon modular-packaging techniques to obtain maximum reliability, minimum production time, and cost savings.

10894* (German.) Computation Methods for Stabilizing Transistor Circuits With Varying Temperature. **Berechnungsmethoden zur Stabilisierung von Transistorschaltungen bei veränderlicher Temperatur.** K. Lunze. *Nachrichtentechnik*, v. 8, no. 3, Mar. 1958, p. 98-108.

The four-pole theory and small-signal parameter; the change of the collector resistance; multiple-stage amplifier; stabilization by nonlinear elements.

10895 Semiconducting Properties of Mg_2Si Single Crystals. R. G. Morris, R. D. Redin, and G. C. Danielson. *Physical Review*, v. 109, ser. 2, no. 6, Mar. 15, 1958, p. 1909-1915.

Results of resistivity and Hall effect measurements on high-purity *n*-type and *p*-type single crystals.

10896* (English.) **Electrical Properties of Ag_2Te.** Shin-ya Miyatani. *Physical Society of Japan, Journal*, v. 13, Apr. 1958, p. 341-350.

Electronic conductivity, Hall constant, and thermoelectric power in a Ag_2Te, show good agreement with the Lorentz-Sommerfeld theory.

10897* (English.) **On the Backward Leakage Current in the Alloyed Germanium p-n Junction.** Makoto Kikuchi. *Physical Society of Japan, Journal*, v. 13, Apr. 1958, p. 350-362.

Some essential remarks are given from theoretical consideration of this phenomenon.

10898* (English.) **The Change of Carrier Concentration in the Simple Semiconductors With Static Magnetic Field.** Yasutada Uemura and Masaharu Inoue. *Physical Society of Japan, Journal*, v. 13, Apr. 1958, p. 377-381.

10899 Properties of p-Type Indium Antimonide. I. Electrical Properties. C. Hilsum and R. Barrie. *Physical Society, Proceedings*, v. 71, Apr. 1958, p. 676-685.

The dependence of electron and hole mobilities on carrier concentration has been determined for samples with impurity concentrations ranging from 10^{14} to 2×10^{17} cm^{-3}.

10900 Electrical and Optical Properties of Some $M_2^{V-B}N_3^{VI-B}$ Semiconductors. J. Black, E. M. Conwell, L. Seigle, and C. W. Spencer. *Physics and Chemistry of Solids*, v. 2, no. 3, 1957, p. 240-251.

The above were synthesized as single crystals of fairly good purity. Resistivity, thermoelectric power, infra-red transmission, and in some cases Hall effect were measured in order to characterize these compounds as semiconductors.

10901 Susceptibility of the Three-Level Maser. A. M. Clogston. *Physics and Chemistry of Solids*, v. 4, no. 4, 1958, p. 271-277.

10902 Quantum Analog of the Ferromagnetic Microwave Amplifier. H. Suhl. *Physics and Chemistry of Solids*, v. 4, no. 4, 1958, p. 278-282.

Certain resemblances between the modes of operation of the three-level maser and the above are shown to be superficial.

10903 Proceedings of the Transistor Reliability Symposium, September 17 and 18, 1956. 128 pp. 1958. New York University Press, New York. (TK7872.T73 T68p Over.)

Nineteen papers are included.

10904* (Russian.) Temperature Stabilization of Voltage Amplifier on Semiconductor Triode. **Temperaturnaia stabilizatsiia usilitelei napriazheniia na poluprovodnikovykh triodakh.** Iu. P. Nosov and B. I. Khazanov. *Radiotekhnika*, v. 13, no. 2, Feb. 1958, p. 28-35.

Gives condition for thermostabilization and suggestions for fulfillment.

10905* (Russian.) Utilization of Ferrites for Producing Coaxial Rectifying Systems. **Primenenie ferritov dlia sozdaniia koaksial'nykh ventil'nykh sistem.** A. L. Mikaelian and M. M. Koblova. *Radiotekhnika*, v. 12, no. 4, Apr. 1958, p. 30-35.

10906* (Russian.) Determination of Boundary Frequency Coefficient of Current Transmission of a Junction-Type Semiconductor Triode. **Opredelenie granichnoi chastoty koeffitsienta peredachi toka ploskostnogo poluprovodnikovogo trioda.** T. M. Agakhanian and L. N. Patrikeev. *Radiotekhnika*, v. 13, no. 4, Apr. 1958, p. 45-52.

10907* (Russian.) Investigation of Ni-Alloys for Oxide Cathode Cores. **Issledovanie nikelevykh splavov dlia kernov oksidnykh katodov.** B. P. Nikonov and B. M. Tsarev. *Radiotekhnika i Elektronika*, v. 3, no. 3, Mar. 1958, p. 313-321.

Shows possibility of using Ni-Ca and Ni-Sr alloys. Such cathodes are easily activated and are stable at 680 to 700 C with current consumption of about 50 ma/cm^2.

10908* (Russian.) Reflection of Slow Electrons From the Surface of Some Metals and Semiconductors. **Otrazhenie medlennykh elektronov ot poverkhnosti nekotorykh metallov i poluprovodnikov.** D. A. Gorodetskii. *Radiotekhnika i Elektronika*, v. 3, no. 3, Mar. 1958, p. 345-354.

Investigated are Au, Ag, Ba, and Ge in vacuum deposited powder layers, and fine Ba and BaO films on Ge; results of the latter are compared with data for Ba and BaO films onGe; results of the latter are compared with data for Ba and BaO films on W.

10909* (Russian.) Work Function of the Antimony-Cesium Cathode. **O rabote vykhoda sur'miano-tsezievogo katoda.** G. A. Zheludeva. *Radiotekhnika i Elektronika*, v. 3, no. 3, Mar. 1958, p. 395-399.

Work function magnitude is constant in the spectral range from 5791 to 2200 Å.

10910* (Russian.) Noise Spectrum and Frequency Characteristics of Photocurrent in Thallous Sulfide Photoresistors. **Spektrshuma i chastotnye zavisimosti fototoka v sernotallievykh fotosoprotivleniiakh.** L. Ia. Pervova. *Radiotekhnika i Elektronika*, v. 3, no. 3, Mar. 1958, p. 405-408.

10911* (Russian.) Emission Characteristics of Some Rare-Earth Metal Hexaborides. **Emissionnye svoistva geksaboridov nekotorykh redkozemle'nykh metallov.** G. A. Kudintseva and B. M. Tsarev. *Radiotekhnika i Elektronika*, v. 3, no. 3, Mar. 1958, p. 428-429.

Thermionic emission of Ca, Sr, Ba, La, Ce, and Th hexaborides. Greatest emission occurred in LaB_6.

10912* (Russian.) Method of Analysis of Amplifiers With Distributed Constants. **Metod analiza usilitelei s raspredelennymi postoiannymi.** Iu. N. Prozorovskii. *Radiotekhnika i Elektronika*, v. 3, no. 4, Apr. 1958, p. 518-521.

Amplifiers with ground cathodes, control grids, or anodic tubes are discussed.

10913 Reliability of Military Electronic Equipment. 377 pp. 1957. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (TK7870 Un3.2r)

Report by the Advisory Group on Reliability of Electronic Equipment, Office of the Assistant Secretary of Defense (Research and Engineering). Program is divided among nine task groups.

10914 Semiconductors, Their Theory and Practice. G. Goudet and C. Meuleau. (Translated from the French by G. King.) 316 pp. 1957. Macdonald & Evans, Ltd., London. (TK7872.S4 G72ttr)

General fundamental theories; technology and applications of semiconductors, thermistors, and Varistors.

10915* Anamorphic Television Circuit Requirements. Madison Cawein. *Society of Motion Picture and Television Engineers, Journal*, v. 67, pt. 1, Apr. 1958, p. 257-259.

10916 Transistor Physics and Circuits. Robert L. Riddle and Marlin P. Ristenbatt. 428 pp. 1958. Prentice-Hall, Inc., Englewood Cliffs, N. J. (TK7872.T73 R43t)

A non-mathematical treatment of the design and operation of transistor circuits.

10917 Transistor Technology. H. E. Bridgers, J. H. Scaff, and J. N. Shive, editors. v. I. 661 pp. 1958. D. Van Nostrand Co., Princeton. (TK7872.T73 B41t)

Technology of Ge materials; preparation of single crystals; principles of device fabrication; principles of transistor performance characterization; transistor reliability.

10918 Transistorization of Nuclear Counting Circuits. R. T. Graveson and H. Sadowski. *U. S. Atomic Energy Commission, HASL-4*, Aug. 19, 1957, 16 pp. (UF767 Un3.1ha Contin.)

The advantages of long operational life, low power drain, and miniaturization may be realized in nuclear counting circuits through the use of transistors.

10919* (German.) The Removal of Electrostatic Charge by Means of Radiating Preparations. **Beseitigung elektrostatischer Aufladung mit Hilfe strahlender Präparate.** Heinz Haase. *VDI Zeitschrift*, v. 100, no. 11, Apr. 11, 1958, p. 437-440.

Radioactive ionizers can be used for discharging surfaces (α-radiators) and for ionizing hollow spaces in closed apparatus.

10920* (Russian.) The Hall Effect in Chromium-Molybdenum Alloys. **Effekt kholla v splavakh khroma s molibdenom.** N. V. Grum-Grzhimailo and I. A. Popov. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 5, May 1958, p. 1227-1231.

10921* (Russian.) The Theory of Electron-Hole Transitions in Semi-Conductors. **K teorii elektronno-dyrochnykh perekhodov v poluprovodnikakh.** B. M. Vul and B. I. Segal. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 4, Apr. 1958, p. 681-688.

10922* (Russian.) Study of the Electrical and Thermoelectrical Properties of AlSb. **Issledovanie elektricheskikh i termoelektricheskikh svoistv AlSb.** D. N. Nasledov and S. V. Slobodchikov. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 4, Apr. 1958, p. 715-724.

The dependence of electric conductivity and of the Hall constant on temperature was studied between 78 and 1200 K.

See also: **10619** (organic semiconductors); **10793** (computer components); **10795** (magnetic memory interrogation); **10989** (wave propagation); **11209** (high temperature stability of permanent magnets); **11230** (properties of Bi, Sb, and $AsTe_3$); **11301** (dislocations in Ge).

ENGINEERING ECONOMICS

10923* The Canadian Chemical Industry. H. R. Dorken. *Chemistry in Canada*, v. 10, May 1958, p. 45 + 3 pages.

Trends in manufacturing, marketing, and export sales.

10924 Comparative National Products and Price Levels. A Study of Western Europe and the United States. Milton Gilbert, et al. 168 pp. 1958. Organisation for European Economic Cooperation, Paris. (HC79 G37c)

Comparison of real levels of expenditure and relative prices in various countries.

10925 The Future Supply of Oil and Gas. Bruce C. Netschert. 134 pp. 1958. Johns Hopkins Press, Baltimore. (HD9565 N38f)

A study of the availability of crude oil, natural gas, and natural gas liquids in the U. S. in the period through 1975.

10926 Chemical Cost and Profitability Estimation—1957. James B. Weaver. *Industrial and Engineering Chemistry*, v. 50, May 1958, p. 753-762.

Review of oral and written presentations in the field of investment, operating cost, and profitability estimation for the process industries. An annotated bibliography of 329 items, subject index, and an analysis of the citations.

10927 Japan's Natural Resources and Their Relation to Japan's Economic Future. Edward A. Ackerman. 655 pp. 1953. University of Chicago Press. (HC462 Ac57j)

Character of resources and requirements. Possible advances in efficiency of resource utilization and associated problems. Relation to the Western world.

10928* An Estimate of Engineering Supply and Demand, 1955-1965. Henry H. Armsby. *Journal of Engineering Education*, v. 48, no. 9, May 1958, p. 715-718.

Tables are presented which combine figures from various sources in order to get an estimate of the relationship between supply and demand for engineers over the near future.

10929* How to Set Up Proper Budgets. Phil Carroll. *Journal of Industrial Engineering*, v. 9, no. 3, May-June 1958, p. 209-212.

Despite weaknesses, budgets are valuable tools for cost control —any control is better than "crisis hysteria".

10930* What the Technological Potential Can Do to Help the Western Mining Industry. B. D. Thomas. *Mines Magazine*, v. 48, Mar. 1958, p. 18-20.

The U. S. basic economy is geared to a very high level, and the Western Mining Industry is a great stabilizing factor in this structure. The production of Au, U, and taconite illustrate this. The technological potential, viewed as the arithmetical product of technology and industrial enterprise, is the basis of the national economic level. Thus, improvements in technology through research, and in industrial enterprise through courage should result in stimulation of the Western Mining Industry and in turn the national economy.

10931* Price Behavior in the Paper Industry. Louis T. Stevenson. *Tappi*, v. 41, May 1958, p. 40A + 2 pages.

See also: **10985** (mining industry of South Africa); **10987** (oil and gas drilling activities in Ohio); **11097** (industrial scrap generation); **11353** (growth of atomic energy industry); **11367** (nuclear energy in Southern U. S.).

FLUID MECHANICS

10932* The Compressible Flow Through Cascade Actuator Discs. J. H. Horlock. *Aeronautical Quarterly*, v. 9, pt. 2, May 1958, p. 110-130.

Approximate solutions for several examples are considered, including a compressible shear flow through a two-dimensional cascade, and a compressible flow through an annular cascade of guide vanes.

10933* (Russian.) Heat Transfer in the Case of Laminar Fluid Motion in Pipes With Allowance for Axial Heat Conduction. **Teplootdacha v trubakh pri laminarnom rezhime dvizheniia zhidkosti s uchetom aksial'noi teploprovodnosti.** D. A. Labuntsov. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 6, Feb. 21, 1958, p. 1118-1120.

10934* (Russian.) Unsteady Flow With Heat Transfer in a Viscous Incompressible Fluid Between Two Rotating Discs When There Is Injection of the Fluid. **Nestatsionarnoe techenie s teploperedachei v viazkoi neszhimaemoi zhidkosti mezhdu dvumia vrashchaiushchimisia diskami pri nalichii vduva.** G. A. Tirskii. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 226-228.

10935* (German.) Thermal Transfer in Water in Small Slots With High Velocity of Flow. A Contribution to the Problem of Water-Cooled Reactors. **Wärmeübergang an Wasser in engen Spalten bei hoher Strömungsgeschwindigkeit. Ein Beitrag zum Problem der wassergekühlten Reaktoren.** Günther Grass. *Allgemeine Wärmetechnik*, v. 8, nos. 5/6, 1957, p. 97-102.

An experimental apparatus for measurement of heat transfer in water between 0 and 40 m/sec up to heat-flux densities of about 700 w/cm^2.

10936 Boundary Layer Along Annular Walls in a Swirling Flow. Hsuan Yeh. *ASME, Transactions*, v. 80, no. 4, May 1958, p. 767-776.

Development of incompressible turbulent boundary layers along concave and convex stationary annular walls is investigated analytically and experimentally for a swirling flow.

10937* (French.) Calculation of the "Margoulis" Number for Steady-State Flow of an Incompressible Fluid in a Circular Tube. **Calcul de l'expression du nombre de Margoulis relatif à l'écoulement d'un fluide incompressible en régime permanent uniforme dans un tube circulaire.** P. Gelin. *Chaleur & Industrie*, 1958, no. 392, Mar., p. 74-80.

Study of a case of forced convection. Explaining the connection between friction and convection with a simple calculation resulting in the Margoulis number as a function of the friction coefficient and of the Prandtl number.

10938* The Hydrodynamics of Flow Between Horizontal Concentric Cylinders. I. Flow Due to Rotation of Cylinder. D. B. Brewster and A. H. Nissan. *Chemical Engineering Science*, v. 7, no. 4, 1958, p. 215-221 + 1 plate.

Approximate velocity distributions for laminar flow between horizontal concentric cylinders with only the inner cylinder rotating were studied for liquid levels other than when the system is completely full.

10939* Countercurrent Gas-Liquid Flow. Stability of a Spherical Liquid Film in an Infinite Airstream. J. E. Howkins and J. F. Davidson. *Chemical Engineering Science*, v. 7, no. 4, 1958, p. 235-240 + 1 plate.

A liquid film runs symmetrically under gravity over a string of spheres suspended in an upward stream of air. At a certain air velocity a standing wave forms on the film covering the lowest hemisphere. The wave is formed at about 30° to the vertical, where the pressure gradients within the airstream, due to its acceleration over the sphere, are a maximum.

10940* (German.) Calculation of Frictionless Flow for a Given Two-Dimensional Cascade at High Subsonic Speeds. **Berechnung der reibungslosen Strömung für ein vorgegebenes ebenes Schaufelgitter bei hohen Unterschallgeschwindigkeiten.** H. Schlichting and E. G. Feindt. *Forschung auf dem Gebiete des Ingenieurwesens* (Ausgabe B), v. 24, no. 1, 1958, p. 19-28.

A simple approximative method developed from the Prandtl and Glauert rule holds for cascades with arbitrary pitch ratios and arbitrary stagger angles provided the blades are of moderate thickness and camber.

10941 Effect of Heat Transfer on Flow Field at Low Reynolds Numbers in Vertical Tubes. Thomas J. Hanratty, Edward M. Rosen, and Robert L. Kabel. *Industrial and Engineering Chemistry*, v. 50, May 1958, p. 815-820.

10942 Electronic Techniques in Liquid Level Measurement. Thomas L. Greenwood. *IRE Transactions on Instrumentation*, v. I-7, no. 1, Mar. 1958, p. 65-68. (TK1 In6.6i Vis.)

Phenomena of electrostatic capacitance and electrolytic conductivity are used in the development of two different systems for use in nonconductive and in conductive liquids.

10943 Flow of a Viscous Liquid on a Rotating Disk. Alfred G. Emslie, Francis T. Bonner, and Leslie G. Peck. *Journal of Applied Physics*, v. 29, May 1958, p. 858-862.

Equations describing the above are solved so that characteristic curves and surface contours at successive times may be constructed.

10944* The Paraboloid of Revolution in Subsonic Flow. M. D. Van Dyke. *Journal of Mathematics and Physics*, v. 37, no. 1, Apr. 1958, p. 38-51.

The subsonic flow past a paraboloid of revolution is calculated according to three different approximations: second-order small-disturbance theory, second-order slender-body theory, and the Janzen-Rayleigh expansion.

19945 (English.) **Method for Computing the Velocity Distribution in a Curved Duct.** Sven Hedman. *Kungligà Tekniska Högskolan. Institutionen för Flygteknik. Technical Notes, TN* 36, 1957, 16 pp. (TL526.S8 K96.4t Contin.)

10946* (Russian.) Interaction of a Shock Wave With a Boundary Layer by the Leading Edge of a Flat Plate at High Supersonic Speeds With Radiation. **Vzaimodeistvie udarnoi volny i pogranichnogo sloia v okrestnosti perednei kromki ploskoi plastinki pri bol'shikh sverhzvukovykh skorostiakh s uchetom lucheispuskaniia.** G. A. Kulonen. *Leningrad. Universitet. Vestnik*, v. 13, no. 7, 1958, p. 172-188.

Calculation of various cases using the integral equation of the momentum for solution of the problem. Influence of radiation on the surface temperature of the flat plate.

10947 (English and French.) Ninth International Congress on Applied Mechanics. **IXe Congrès International de Mécanique Appliquée. v. I-II.** 492 and 581 pp. 1957. Université de Bruxelles, Belgium. (TA5 In8p9)

Papers on various aspects of fluid mechanics and aerodynamics.

10948 Characteristic Direction for Equations of Motion of Non-Newtonian Fluids. J. L. Ericksen. *Pacific Journal of Mathematics*, v. 7, no. 4, Winter 1957, p. 1557-1562.

10949 Interaction of Cylindrical Sound Waves With a Stationary Shock Wave. W. R. Johnson and Otto LaPorte. *Physics of Fluids*, v. 1, no. 2, Mar.-Apr. 1958, p. 82-94.

The incident cylindrical sound wave is represented as a superposition of plane sound waves of varying direction. Each of the plane waves in this superposition interacts with the shock giving rise to a previously determined distortion of the shock front and reflected or refracted wave field; the cylindrical wave causes a disturbance which may be written in integral form as a superposition of these plane waves. The resulting interaction integrals are evaluated asymptotically to give explicit formulas for the distortion of shock, sound field, and entropy-vorticity wave.

10950 Heat Transfer to Surfaces in the Neighborhood of Protuberances in Hypersonic Flow. Martin H. Bloom and Adrian Pallone. *U. S. Air Force, Wright Air Development Center, WADC Technical Note* 57-95, Aug. 1957, 32 pp. (TL507 Un3.18t Contin.)

10951 Charts for Flow Parameters of Helium at Hypersonic Speeds, Mach Number 10 to 20. *U. S. Air Force, Wright Air Development Center, WADC Technical Note* 57-377, Nov. 1957, 63 pp. (TL507 Un3.18t Contin.)

10952 Incompressible Friction Factor, Transition and Hydrodynamic Entrance Length Studies of Ducts With Triangular and Rectangular Cross-Sections. E. R. G. Eckert and T. F. Irvine, Jr. *U. S. Air Force, Wright Air Development Center. WADC Technical Report*, 58-85, Apr. 1957, 34 pp. (TL507 Un3.18w Vis.)

Measurements are presented on friction factors, critical Reynolds numbers, and hydrodynamic entrance lengths of air flowing with subsonic velocities through non-circular ducts.

10953 The Calculation of the Wall Temperature Along Surfaces Which Are Exposed to a Fluid Stream When the Local Heat Flow Through the Surfaces Is Prescribed. E. R. G. Eckert, J. P. Hartnett, and Roland Birkebak. *U. S. Air Force, Wright Air Development Center. WADC Technical Report* 57-315, May 1957, 24 pp. (TL507 Un3.18w Vis.)

A simple design procedure is developed for the calculation of the wall temperatures along surfaces with a prescribed heat flow distribution. The method is applicable to either laminar or turbulent boundary layer flow with zero pressure gradient.

10954 Two-Phase Air-Water Flow Phenomena. Michael Petrick. *U. S. Atomic Energy Commission, ANL*-5787, Mar. 1958, 88 pp. (UF767 Un3.1an Contin.)

An experimental two-phase flow study was conducted on a series of Lucite rectangular channels with aspect ratios of 2 to 16 using an air-water system at atmospheric pressure. The density of the air-water mixture changed during either an expansion or contraction of flow area; but the change was not great and was readily predicted by a semi-theoretical equation.

10955 Average Properties of Compressible Laminar Boundary Layer on Flat Plate With Unsteady Flight Velocity. Franklin K. Moore and Simon Ostrach. *U. S. National Advisory Committee for Aeronautics, Report* 1325, 1957, 12 pp. (TL521 Un3r Vis.)

The time-average characteristics of boundary layers over a flat plate in nearly quasi-steady flow are determined. The plate may be either insulated or isothermal. The time averages are found without specifying the plate velocity explicitly except that it is positive and has an average value.

10956 Attenuation in a Shock Tube Due to Unsteady-Boundary-Layer Action. Harold Mirels. *U. S. National Advisory Committee for Aeronautics, Report* 1333, 1957, 19 pp. (TL521 Un3r Vis.)

A method is presented for obtaining the attenuation of a shock wave in a shock tube due to the unsteady boundary layer along the shock-tube walls.

10957 Analysis of Turbulent Flow and Heat Transfer on a Flat Plate at High Mach Numbers With Variable Fluid Properties. R. G. Diessler and A. L. Loeffler, Jr. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4262, Apr. 1958, 61 pp. (TL570 Un3t Vis.)

10958 Summary of Experimental Heat-Transfer Measurements in Turbulent Flow for a Mach Number Range From 0.87 to 5.05. Maurice J. Brevoort and Barbara D. Arabian. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4248, May 1958, 43 pp. (TL570 Un3t Vis.)

An axially symmetric annular nozzle was used to obtain essentially flat-plate data on turbulent heat-transfer coefficients and temperature-recovery factors.

10959 Measurement of the Effect of an Axial Magnetic Field on the Reynolds Number of Transition in Mercury Flowing Through a Glass Tube. Michel Bader and William C. A. Carlson. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4274, May 1958, 8 pp. (TL570 Un3t Vis.)

The magnetic induction was 15,000 gauss, and the channel was a pyrex tube 17¾-in. long and 0.027-in. inside diameter. Application of the magnetic field produced very little change in Reynolds number of transition when large initial disturbances were introduced at the entrance to the flow tube.

See also: **10969** (flow visualization); **11344** (pressure loss and flow in cooling ducts).

FOOD TECHNOLOGY

10960* Effect of Hormones on Composition of Chicken Meat. W. W. Marion, K. N. May, R. L. Wesley, and W. J. Stadleman. *American Dietetic Association, Journal*, v. 34, June 1958, p. 611-614.

In this study, diethylstilbestrol implantation significantly increased the fat content of the chicken meat. Lesser effects were found on the protein and moisture content.

10961* The Influence of Antibiotics on Micro-Organisms Causing Fruit and Vegetable Rots. Walter H. Muller. *American Journal of Botany*, v. 45, no. 3, Mar. 1958, p. 183-190.

Biological spectra for certain antibiotics are presented using various pathogenic microorganisms. The antibiotics were frequently less effective in the presence of agar or other adsorbing materials than they were in liquid media alone.

10962* The Microbiologic Assay of Vitamins in Clinical Chemistry. Donald D. Van Slyke Lecture, 1958. Harry Sobotka. *Clinical Chemistry*, v. 4, no. 2, Apr. 1958, p. 93-106.

Gives examples in the cyanocobalamin and folic acid field to illustrate the usefulness of the microbiologic assay of vitamins in investigative work. Summarizes the vitamins for which assay methods have been developed, microorganisms used, and their sensitivity.

10963 Mycological Formation of Fat. V. Factors Which Influence the Formation of Fat in Surface Cultures of *Penicillium lilacinum Thom*. Sudha E. Philip and T. K. Walker. *Journal of the Science of Food and Agriculture*, v. 9, Apr. 1958, p. 223-227.

When *Penicillium lilacinum* Thom was grown as surface cultures in a defined medium containing sucrose, essential mineral salts and sodium nitrate, it produced fat in very high yield (54.4 g. fat/100 g. felt and 17.4 g. fat/100 g. sucrose consumed).

10964 The State of Food and Agriculture, 1957. 171 pp. Food and Agriculture Organization of the United Nations, Rome. (HD1411 F73s Over.)

A report concerned with: world review and outlook; factors influencing the trend of food consumption; postwar changes in some institutional factors affecting agriculture.

FUELS AND COMBUSTION

10965* (German.) The Physical and Chemical Properties of the Structural Constituents of Mineral Coal (Macerals). **Die physikalischen und chemischen Eigenschaften der Steinkohlengefügebestandteile (Macerale). IX.** Behavior of the Lithotypes and Macerals During Oxidation With Chlorine Dioxide. **Das Verhalten der Lithotypen und Macerale bei der Oxydation mit Chlordioxyd.** Carl Kröger and Dietrich Hillmann. *Brennstoff-Chemie*, v. 39, nos. 7/8, Apr. 1958, p. 110-118.

A study of the oxidation behavior of the structural constituents of coals during reaction with aqueous ClO_2 solutions. Calorimetric measurements. Production of regenerated humic acids.

10966* (Hungarian.) Determination of the Combustion Temperature by the Aid of Thermodynamic Computations. **Az égéshőmérséklet meghatározása termodinamikai számításssal.** Aurél Horváth. *Kohászati Lapok*, v. 13, nos. 2-3, Feb.-Mar. 1958, p. 91-96.

Determination based on the equality of the heat of reaction and of the enthalpy of the products of combustion. Three methods to compute maximum flame temperature.

10967 Flow Field of a Bunsen Flame. M. S. Uberoi, A. M. Kuethe, and H. R. Menkes. *Physics of Fluids*, v. 1, no. 2, Mar.-Apr. 1958, p. 150-158.

A two-dimensional Bunsen flame is examined by approximating the zone of combustion by a surface of discontinuity across which the density drops and normal velocity increases.

10968* (German.) Characteristic Elements of the Coking of Coal. **Charakteristische Elemente der Kohlenverkokung. I.** Bitumen of Coking Coals. Petroleum Cokes. **Über das Bitumen der verkokungsfähigen Kohlen. Petroleumkokse.** I. L. Blum. *Revue d'Électrotechnique et d'Énergétique*, v. 1, no. 2, 1956, p. 151-168.

Chemical and technical properties of high- and low-pressure petroleum cokes. Yield and composition of the gases produced by the pyrogenic decomposition of petroleum cokes. Plasticity of a gas coal, coking coal, and a petroleum coke. Extraction and composition of the bitumens.

10969* Flow Visualization Techniques Applied to Combustion Problems. E. F. Winter. *Royal Aeronautical Society, Journal*, v. 62, Apr. 1958, p. 268-276.

By suitable lighting arrangements, tracer type, means of tracer injection, and camera operation many diverse phenomena can be studied.

10970 (Czech.) General-Purpose Steam Boiler With Double-Channel Chamber and Slag Granulating Device, Operating on Low-Grade Fuel. **Universální granulační kotel s dvoutahovou komorou.** V. Kouba and J. Mikl. *Strojírenství*, v. 8, no. 4, Apr. 1958, p. 257-262.

Design of a steam boiler developed for operation on poor quality lignite in the widest range of caloric values, moisture and ash contents. This very versatile and highly efficient unit can operate on any combination of lignite and black coal.

See also: **10455** (synthesis gas purification); **10704** (origin of CO and point of attack of O in hydrocarbons).

GEOLOGY, GEOPHYSICS, MINERALOGY, AND MINING ENGINEERING

10971* (French.) Progress in Cosmic-Ray Research. **Le progrès dans la recherche sur les rayons cosmiques.** B. Peters. *Âge Nucléaire*, 1958, no. 9, Mar.-Apr., p. 57-64.

Primary cosmic radiation. Measuring the atomic number of fast nuclei, and the energy of a particle. Cosmic radiation in our galaxy. Origin of radioelectric noise. Origin and composition of the cosmic radiation particles.

10972* (Russian.) An Experimental Study of the Influence Exerted by External Pressure on the Permeability of Oil-Bearing Rocks. **Eksperimental'noe issledovanie vliianiia vneshnego**

davleniia na pronitsaemost' neftesoderzhashchikh porod. N. S. Gudok and M. M. Kusakov. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 229-232.

10973* (Russian.) Gravitational Anomalies and Earth Crust Thickness in Continental Regions. **Gravitatsionnye anomalii i moshchnost' zemnoi kory kontinental'nykh oblastei.** B. A. Andreev. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 255-256.

10974* (Russian.) Determination of Dynamic Parameters of Epicenters by Means of Recordings of Surface Waves. **Ob opredelenii dinamicheskikh parametrov ochaga zemletriaseniia po zapisiam poverkhnostnykh voln. I.** T. B. Ianovskaia. *Akademiia Nauk SSSR, Izvestiia, Seriia Geofizicheskaia*, 1958, no. 3, p. 289-301.

10975* (Russian.) Apparatus and Method of Registering of Turbulent Micropulsations of Temperature and Velocity of Sea Currents. **Apparatura i metodika registratsii turbulentnykh mikropul'satsii temperatury i skorosti techeniia v more.** A. G. Kolesnikov, et al. *Akademiia Nauk SSSR, Izvestiia, Seriia Geofizicheskaia*, 1958, no. 3, p. 405-413.

10976* (Russian.) The Electrical Conductivity and Temperature of the Earth's Mantle. **Ob elektroprovodnosti i temperature obolochki zemli.** V. H. Zharkov. *Akademiia Nauk SSSR, Izvestiia, Seriia Geofizicheskaia*, 1958, no. 4, p. 458-470.

10977* (Russian.) Propagation of Tidal Waves From a Strait in an Open Reservoir. **Rasprostranenie prilivnykh voln iz proliva v otkrytyi bassein.** S. S. Voit. *Akademiia Nauk SSSR, Izvestiia, Seriia Geofizicheskaia*, 1958, no. 4, p. 486-496.

10978* Environmental Studies of Carboniferous Sediments. II. Application of Geochemical Criteria. E. T. Degens, E. G. Williams, and M. L. Keith. *American Association of Petroleum Geologists, Bulletin*, v. 42, May 1958, p. 981-997.

Investigation shows that the fresh-water or marine character of sedimentary rocks can be determined by goechemical criteria. It appears likely that trace element studies will be found to be generally useful in stratigraphy and paleogeography, by facilitating the environmental determination of non-fossiliferous rocks.

10979* Carbon Isotopic Compositions of Petroleums and Other Sedimentary Organic Materials. Sol R. Silverman and Samuel Epstein. *American Association of Petroleum Geologists, Bulletin*, v. 42, May 1958, p. 998-1012.

Carbon isotope analyses of petroleums, modern plant constituents, and other sedimentary organic materials indicate that the range of C-13/C-12 ratios in organic carbon is about 4.5‰. The range of variation in petroleums alone is about 1‰. In view of the narrow range of isotopic composition in petroleums, gas formation does not appear to be an important natural mechanism for depleting oil fields.

10980 American Institute of Mining, Metallurgical, and Petroleum Engineers, Transactions. (Annual Volume), v. 208, 1958, sections individually paged. American Institute of Mining, Metallurgical, and Petroleum Engineers, New York. (TS1 Am35t Vis.)

Papers of the Society of Mining Engineers for 1957 in the fields of mining, minerals beneficiation, coal, industrial minerals, geology, and geophysics.

10981 American Institute of Mining, Metallurgical, and Petroleum Engineers, Transactions. (Annual Volume), v. 210, 1958, 424 pp. American Institute of Mining, Metallurgical, and Petroleum Engineers, New York. (TS1 Am35t Vis.)

Papers of the Society of Petroleum Engineers for 1957.

10982* Design of Simple Punched Card Systems With Reference to Geochemical Problems. Irving A. Breger. *Economic Geology*, v. 53, no. 3, May 1958, p. 325-338.

Critical factors in the design of files using marginally punched cards are discussed in general terms and exemplified by reference to a system developed for use in geochemical studies.

10983 The Exploration of Space by Radio. R. Hanbury Brown and A. C. B. Lovell. 207 pp. 1957. Chapman and Hall, Ltd., London. (QB475 B81s)

Astronomical background; properties of radio waves; techniques; galactic and extragalactic radio emissions; the H line; scintillation of radio stars; solar radio waves; meteors; radio and the aurora borealis; radio investigations of the moon, planets, and the earth satellites; the Jodrell Bank radiotelescope.

10984* Geomagnetic Pulsations and the Earth's Outer Atmosphere. T. Obayashi and J. A. Jacobs. *Geophysical Journal*, v. 1, no. 1, Mar. 1958, p. 53-63.

Hydromagnetic oscillations of the Earth's ionized outer atmosphere along the geomagnetic lines of force are considered.

10985* South African Mining in 1957. L. A. Waspe. *Mining Magazine*, v. 98, no. 4, Apr. 1958, p. 206-213.

Technical developments; production of diamonds, Au, Pt, coal, and other minerals.

10986 Third Annual Symposium on Mining Research, November 14 and 15, 1957. George B. Clark, editor. *Missouri. University. School of Mines and Metallurgy, Bulletin. Technical Series No.* 95, 1958, 149 pp. (QE131 M69.85t Vis.)

Papers deal with application of basic science and modern instrumentation to ventilation, drilling, and dust-collection problems, also with blasting development, particularly the extensive use of NH_4NO_3-fuel oil explosives.

10987 1957 Oil and Gas Developments in Ohio. George G. Shearrow. *Ohio. Geological Survey. Report of Investigations No.* 35, 1958, 27 pp. (QE151 Oh3re Vis.)

A summary of drilling activities.

10988 A Presentation of Solar Radiation Data Obtained by a Spectroheliometer. Y. T. Sihvonen, R. F. Majkowski, and W. Slater. *Solar Energy*, v. 2, no. 1, Jan. 1958, p. 21-25.

Spectroheliometer continuously records and integrates the sun's radiant power in five selected wavelength intervals, and in addition incorporates a pyroheliometer to measure over-all solar radiation.

10989 On the Propagation of Random Electromagnetic Waves in Free Space. Mark J. Beran. *U. S. Air Force, Cambridge Research Center, TR*-58-112, Feb. 1958, 35 pp. (TK7800 Un3.12b Contin.)

Above is based on the use of ensemble averages and is in the main a scalar theory.

10990 Analysis of Meteorological Tower Data, April 1950-March 1952, Brookhaven National Laboratory. Irving A. Singer and Gilbert S. Raynor. *U. S. Atomic Energy Commission, BNL*-461 (T-102), June 1957, 93 pp. (UF767 Un3.Ibn Contin.)

See also: **10721** (research in mineral engineering problems); **10853** (scattered signals); **11158** (recovery of Li from spodumene).

GRAPHIC ARTS

10991 New Concepts of Printing Production in the Packaging Industries. J. Homer Winkler. *American Management Association, Packaging Series No.* 42, 1953, p. 22-31. (HF5770 Am35p Vis.)

Increased use of research methods and applied engineering in the graphic arts has resulted in numerous significant developments in the packaging field. Practical applications relating to in-line equipment, phototypesetting, pre-make-ready aids, photoengraving, electrotype developments, flexographic printing, gravure processes, offset lithography, screen-process printing, and the dry litho process are described.

10992* The New Era in Graphic Arts. Martin Johnson. *American Printer and Lithographer*, v. 139, Apr. 1958, p. 43-45.

Relief printing plates of photosensitive nylon and plastic are among the major recent advances.

10993 Evolution of the Printing Machines and Printing Techniques. E. R. Adams. *British Paper and Board Makers' Association (Inc.), Proceedings of the Technical Section*, v. 38, pt. 3, Dec. 1957, p. 453-468. (TS1080 P19p Vis.)

10994 Developments in Printing Techniques — Some Thoughts on Paper Requirements. R. R. Coupe. *British Paper and Board Makers' Association (Inc.), Proceedings of the Technical Section*, v. 38, pt. 3, Dec. 1957, p. 469-483. (TS1080 P19p Vis.)

Some properties of paper that have become more important as a result of changes in printing technique.

10995 Paper for Printing. G. A. Cramond. *British Paper and Board Makers' Association (Inc.), Proceedings of the Technical Section*, v. 38, pt. 3, Dec. 1957, p. 485-514. (TS1080 P19p Vis.)

A survey of the modifications made on paper to meet modern trends in printing and a plea for cooperation of the printing and paper industries in the development of paper tests more appropriate to the strains and stresses to which paper has to be submitted in the printing operation.

10996 How to Reclaim Silver From Old Hypo. Robert Paterson. *Canadian Printer and Publisher*, v. 67, Apr. 1958, p. 68 + 1 page.

Chemical methods utilize Na_2S or Zn dust. Two electrolytic methods are described.

10997 Why Is Exact Packing Important? Michael Zaleski. *Canadian Printer and Publisher*, v. 67, Apr. 1958, p. 76 + 1 page.

Explains why wrong cylinder packing on offset presses deforms the print and contributes to plate wear.

10998 Microsecond Photography. *Electromechanical Design*, v. 2, no. 3, Apr. 1958, p. 42-43.

A 1μ sec. magneto-optic shutter stops fast transient events such as flame fronts, shock waves, and high explosives.

10999 Management vs. Research. Marvin C. Rogers. *Gravure*, v. 4, Apr. 1958, p. 19 + 3 pages.

An analysis of the current state of science in printing.

11000* How to Handle Presensitized Plates in Your Offset Plant. Gyan P. Madan. *Inland Printer*, v. 141, no. 1, Apr. 1958, p. 50-53.

Step-by-step processing procedure for presensitized plates.

11001* Color-Coded Multiple-Image Photography for Studying Related Rates of Movement. Frank Pierce Jones, D. N. O'Connell, and J. A. Hanson. *Journal of Psychology*, v. 45, Apr. 1958, p. 247-251.

Photographic method of studying certain human movements as patterns of response.

11002 The Flash Photography of a Deep Field of View. F. De S. Barros, D. M. Binnie, and B. D. Hyams. *Journal of Scientific Instruments*, v. 35, no. 4, Apr. 1958, p. 129-131.

11003* Dot Etching and Color Proving. James M. Nolan. *National Lithographer*, v. 65, May 1958, p. 28 + 1 page.

Methods, ideas, and tricks for making color corrections.

11004* A Half Century of Press Improvements. John Matthews. *National Lithographer*, v. 65, May 1958, p. 57 + 2 pages.

Evolution of England's offset presses for metal decorating.

11005 Preparation of Color-Wedged Film Samples for Use in a Neutral Selector. R. H. Morris. *Optical Society of America, Journal*, v. 48, Apr. 1958, p. 225-227.

Mathematical development of technique for arriving at the required conditions for exposing film sheets characterized by an equiluminous area with uniform color gradients.

11006* A Sensitometric Study of Film and Rapid Processing Solution Combinations. William M. Drumm. *Photographic Science and Engineering*, v. 1, no. 4, Mar. 1958, p. 147-155.

Studies of a variety of black-and-white emulsions processed in developers and monobaths showed that rapid developers produce acceptable results in most instances, although fog, speed, and gamma varied significantly, depending on emulsion type, composition of developer, and processing time.

11007* Flash Processing: A Rapid Access Photographic Technique. J. Howard Jacobs. *Photographic Science and Engineering*, v. 1, no. 4, Mar. 1958, p. 156-160.

Technique not only retains the advantages of Ag halide emulsions as to photographic speed and permanence, but also permits access to data within one second after they have been recorded.

11008* Printable Faces on Display Slugs. Theodore Gardiner. *Printing Equipment Engineer*, v. 88, no. 8, May 1958, p. 52-54.

Suggestions for producing large point size slugs with clear type faces from line casting machines.

11009* How the International Helps Your Club and You. J. Homer Winkler. *Share Your Knowledge Review*, v. 39, no. 8, May 1958, p. 3-6.

The program of the International Association of Printing House Craftsmen is aimed at coordinating the activities of local clubs seeking to maintain effective operation in the face of rapid technological advances.

11010* Flying Camera Stations. Floyd A. Kinder. *Society of Motion Picture and Television Engineers, Journal*, v. 67, pt. 1, Apr. 1958, p. 234-237.

To obtain attitude, trajectory and documentary data of missiles launched from aircraft at high altitudes an Airborne Cinetheodolite has been proposed.

11011* Photographic Instrumentation at the Air Proving Ground Center. H. C. Schepler. *Society of Motion Picture and Television Engineers, Journal*, v. 67, pt. 1, Apr. 1958, p. 246-248.

Precise spatial position of airborne test objects such as rockets, bombs, and missiles is recorded photographically.

See also: **11033** (computer for processing photographic information).

HEAT POWER

11012* (Russian.) Investigation of the Initial Period of Induction in a Vortex-Chamber Diesel. **Issledovanie nachal'nogo perioda induktsii vikhrekamernogo dizelia.** A. V. Terzian. *Akademiia Nauk Armianskoi SSR, Izvestiia, Seriia Tekhnicheskikh Nauk*, v. 11, no. 2, 1958, p. 37-44.

11013 Blade Flutter in Axial Flow Turbomachines. Jan R. Schnittger. *Applied Mechanics Reviews*, v. 11, Apr. 1958, p. 151-155.

Review dealing with aerodynamic excitations in potential and stalled flow, the aerodynamic mechanism of self-sustained bending mode vibration in stalled flow, and blade stresses.

11014 General Design Considerations for Smaller Gas Turbines. W. T. von der Nuell. *ASME, Transactions*, v. 80, no. 4, May 1958, p. 941-958.

Most developmental activity is in the vehicle propulsion field for units up to 500 hp.

11015 The Formulation of Steam Properties for Digital Computer Application. William G. Steltz and George J. Silvestri. *ASME, Transactions*, v. 80, no. 4, May 1958, p. 967-973.

Methods and equations for approximating the properties of steam set forth in the Keenan and Keyes' Steam Tables.

11016* Investigation of a Jet Muffler Model. A. J. Campbell. *Canadian Aeronautical Journal*, v. 4, no. 5, May 1958, p. 165-168.

Possibility of reducing the main internal noise source output by aerodynamic means and of decreasing the radiated sound by acoustic treatment.

11017 Analog Computer Study of the Transient Performance of a Dual-Cycle Boiling-Water-Reactor Nuclear Power Plant. David W. Leiby. *Communication and Electronics*, 1958, no. 35, Mar., p. 17-25.

11018 Valve Point Loading of Turbines. G. L. Decker and A. D. Brooks. *Electrical Engineering*, v. 77, June 1958, p. 501.

Notes on adjustment for maximum efficiency.

11019 Thermo-Electron Engine. *Electromechanical Design*, v. 2, no. 3, Apr. 1958, p. 27-28.

Atomic heat is converted directly to electricity without moving parts.

11020 Gas Turbine Materials. G. Lucas and J. F. Pollock. 163 pp. 1957. Temple Press, Ltd., London. (TJ778 L96g)

A survey of high-temperature materials and their application to the gas turbine.

11021* The Method of Equivalent Replacements Applied to the Investigation of Force Transfer and Power Exchange in a Stage of a Turbomachine. V. T. Yourinsky and R. G. Narayanamurthi. *Indian Institute of Science, Journal*, v. 40, sec. B, no. 1, Jan. 1958, p. 11-57.

An analysis of the complicated phenomenon of power transfer in a stage of a turbomachine is presented in a simple manner by the introduction of an original concept of "an equivalent stream" and the connected "mathematical profile".

11022* Squeeze More Work Out of an Engine. B. G. A. Skrotzki. *Power*, v. 102, May 1958, p. 88-91.

Supercharging the Otto cycle raises peak pressure and temperature and produces more work.

11023* (German.) The Intersecting-Point Procedure as a Means for Computing Heat Exchangers. **Ein Schnittpunktverfahren als Hilfsmittel bei der Berechnung von Wärmeaustauschern.** K. Winkler. *Radex Rundschau*, 1958, no. 2, Mar., p. 63-71.

Graphic determination of temperatures of walls and of quantities of heat transferred; combined transfer of heat; simplified precise calculation of recuperation.

11024* (French.) Measuring the Ignition Time of Rocket Motors With Liquid Hypergols at a Simulated Altitude. **La mesure du délai d'allumage en altitude simulée des moteurs fusées a hypergols liquides.** Pierre Sarrat. *Recherche Aéronautique*, 1958, no. 62, Jan.-Feb., p. 15-25.

The ignition delays measured on microrockets with the apparatus described are close to those obtained with laboratory equipment, when the experimental pressure is close to atmospheric. The initial peaks of pressure were determined in relation to the ignition delay and the chemical nature of the propergol.

11025 (Italian.) Volatility and Performance of Car Gasoline. **Volatilità e prestazioni dei carburanti auto.** F. Mina. *Rivista dei Combustibili*, v. 12, no. 2, Feb. 1958, p. 99-130.

A review of volatility factors connected with performance characteristics such as easy starting, warming-up, and acceleration. Laboratory and road test techniques. Future volatility trends in connection with increasing octane demand.

11026* (Norwegian.) Diesel Motors for Engine Propulsion. **Dieselmotorer for lokomotivdrift.** Ivar B. Stokke. *Teknisk Ukeblad*, v. 105, no. 16, Apr. 17, 1958, p. 349-358.

Theoretical and practical superiority of the turbo-supercharged four-stroke diesel motor to the two-stroke diesel motor with mechanical centrifugal chargers.

11027 Far Noise Field of Air Jets and Jet Engines. Edmund E. Callaghan and Willard D. Coles. *U. S. National Advisory Committee for Aeronautics, Report* 1329, 1957, 18 pp. (TL521 Un3r Vis.)

Circular, square, rectangular, and elliptical convergent nozzles and convergent-divergent and plug nozzles were investigated to determine the effect of exit shape on noise generation.

11028 Preliminary Survey of Propulsion Using Chemical Energy Stored in the Upper Atmosphere. Lionel V. Baldwin and Perry L. Blackshear. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4267, May 1958, 73 pp. (TL570 Un3t Vis.)

Ram-jet cycles that use the chemical energy of dissociated oxygen for propulsion in the ionosphere are presented.

11029 A Performance Analysis of Methods for Handling Excess Inlet Flow at Supersonic Speeds. Donald P. Hearth and James F. Connors. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4270, May 1958, 26 pp. (TL570 Un3t Vis.)

A comparison was made of several methods for the Mach number range from 1.5 to 4.0. Techniques were examined and evaluated in terms of their respective thrust penalties for an assumed turbojet engine.

11030* (German.) Effects of Pressure and Temperature on the Ignition Limits and Explosion Pressures in the Case of Gas-Air- and Vapor-Air Mixtures. **Abhängigkeit der für Gas-Luft- und für Dampf-Luft-Gemische angegebenen Zündgrenzen und Explosionsdrücke vom Druck und von der Temperatur.** Kurt Prahl. *VDI Zeitschrift*, v. 100, no. 10, Apr. 1, 1958, p. 405-407.

The ignition limit and the number of vapor or gas molecules in relation to the number of air elements. Vapor pressure of an alcohol vapor-air mixture.

See also: **10571** (ACS petroleum chemistry preprints); **11068** (wear in diesel engines); **11073** (performance of diesel locomotives); **11080** (steam turbine starting schedule); **11120** (alloys for gas turbines).

INFORMATION—PREPARATION AND DISSEMINATION

11031 Report of the Literature Review Committee. 24th Annual Review of the Literature on Fats, Oils, and Detergents. M. M. Piskur. *American Oil Chemists' Society, Journal*, v. 35, May 1958, p. 208-225.

Economic information; production processes; products; deterioration of fatty materials; nutrition, physiology and biochemistry; characteristics and composition; detergents.

11032* Castilla's Spanish and English Technical Dictionary. v. I-II. 1611 and 1137 pp. 1958. Philosophical Library, New York. (P51 C27 Ref.)

Excludes terms from the realms of pure science that have no immediate technical connotation, while including commercial and legal terms that have. Considerable emphasis has been laid upon technological branches that have developed and are likely to develop most rapidly.

11033* Pictorial Information Processed on a Digital Computer. *Computers and Automation*, v. 7, May 1958, p. 16-19.

Use of the SEAC as a memory device is very inefficient, but it may be applied to photogrammetric analysis of stereographic photographs.

11034 Presently Available Tools for Information Retrieval. Jacob Rabinow. *Electrical Engineering*, v. 77, June 1958, p. 494-498.

Potentialities and limitations in the art of information searching are reviewed.

11035* A Permanent Binding Record for Periodicals. Mary Robinson. *Journal of Documentation*, v. 14, no. 1, Mar. 1958, p. 12-13.

A simplified card file system.

11036* Reporting Through the Looking Glass. Warren W. Wood. *Journal of Engineering Education*, v. 48, no. 9, May 1958, p. 722-725.

A criticism of present practices in preparing and publishing scientific reports.

11037 Developments in Copying Methods—1957. David C. Weber. *Library Resources & Technical Services*, v. 2, no. 2, Spring 1958, p. 87-94.

Reviews techniques and equipment.

11038 The Treatment of Serials at the Midwest Inter-Library Center. Ralph T. Esterquest. *Library Resources & Technical Services*, v. 2, no. 2, Spring 1958, p. 121-127.

Some experimental procedures undertaken at the MILC in its six years of existence are reviewed.

11039* Acquisition and Technical Processing. Miles O. Price. *Library Trends*, v. 6, Apr. 1958, p. 430-458.

Legal aspects of these operations are studied. Includes 138 references.

11040 Technical Writing Isn't Easy, But—. W. A. Sylvester. *Petroleum Refiner*, v. 37, Apr. 1958, p. 253-255.

Suggestions for making technical reports more readable.

11041 Proceedings of the International Study Conference on Classification for Information Retrieval, Held at Beatrice Webb House, Dorking, England, 13th-17th May 1957. 151 pp. Pergamon Press, New York. (Z696 In8p)

Eight papers on classification of a subject field, problems in constructing a general classification, and notation mechanisms.

11042* A Review of the Literature of 1957 on Sewage, Waste Treatment, and Water Pollution. H. Heukelekian, et al. *Sewage and Industrial Wastes*, v. 30, May 1958, p. 601-608.

See also: **10783** (pictorial photographic recorder); **10982** (design of punched card filing system).

INSTRUMENTATION

11043 Measurements of Pressure Distribution Between Metal and Rubber Covered Rollers. G. J. Parish. *British Journal of Applied Physics*, v. 9, Apr. 1958, p. 158-161.

Measurements of pressure distribution in the nip between a metal roller and a roller consisting of a thin rubber cover on a metal shell under various conditions of load, cover hardness and cover thickness are described. The results, although in qualitative agreement with Hannah's theory, show appreciable deviations from the quantitative theoretical predictions, and the possible causes of this discrepancy are discussed.

11044 A Vacuum Furnace for Electrical Conduction Studies Up to 2000 C. W. E. Danforth and H. Bleecher. *Franklin Institute, Journal*, v. 265, no. 4, Apr. 1958, p. 303-308.

Details and performance characteristics. The hot zone is approximately 3 cm. in diameter and 12 cm. long; power required for 2000 C is approximately 6 kw.

11045 Arc Image Furnace Produces Temperatures Above 7000° F. *Industrial Heating*, v. 25, Apr. 1958, p. 728 + 2 pages.

Two highly-polished curved mirrors concentrate rays from a C arc into a small but high-energy beam that can produce temperatures above 7,000 F.

11046* Measurement of Current With a Pellat-Type Electrodynamometer. R. L. Driscoll. *Journal of Research, National Bureau of Standards*, v. 60, no. 4, Apr. 1958, p. 287-296.

Uncertainty is estimated to be eight p.p.m.

11047 An Improved Czochralski Crystal-Pulling Furnace. K. H. J. C. Marshall and R. Wickham. *Journal of Scientific Instruments*, v. 35, no. 4, Apr. 1958, p. 121-125.

Suitable for pulling single crystals of Ge and Si.

11048 A Simple Instrument for the Periodic Application of Controlled Bi-Axial Strains. P. U. A. Grossman. *Journal of Scientific Instruments*, v. 35, no. 4, Apr. 1958, p. 131-134.

This instrument produces harmonically varying strains in a thin layer of a test material and controls in two dimensions the frequencies, amplitudes and phases. Weissenberg's method of a flexible boundary is employed to obtain homogeneous strain and a uniform break-up pattern when fatigue failure is approached. The fatigue of powders under various testing conditions is described and the emergent break-up patterns are discussed.

11049 An Automatic Quartz-Fibre Electrometer. M. C. B. Russell and J. Leng. *Journal of Scientific Instruments*, v. 35, no. 4, Apr. 1958, p. 134-138.

Describes instrument for automatic recording of β-activity within the range 0.04 to 30μC. An average rate of change of potential may be determined with probable errors of about $\pm$0.2 mv.

11050 A High Stability Mains-Operated Recording Thermistor Thermometer. A. W. Melville. *Journal of Scientific Instruments*, v. 35, no. 5, May 1958, p. 179-180.

The thermometer has a total variation at less than 1% for a mains variation of 10% and a warm up time of less than 5 min. Full scale deflexion corresponds to 10 F.

11051 Germanium Resistance Thermometer. *Metallurgia*, v. 57, May 1958, p. 250.

Indicates low temperatures accurately and reliably. No continued recalibration at 4.2 K.

11052 High-Speed, Direct-Reading Glossmeter. J. G. Schreckendgust and D. M. Gowing. *Optical Society of America, Journal*, v. 48, Apr. 1958, p. 241-245.

Device which measures specular reflectance at 20, 60, and 85° angles employs a direct parallel beam at each viewing angle, and utilizes compensated barrier cell circuits to activate a stable positioning servomechanism.

11053 Double-Beam Infrared Microspectrometer. M. A. Ford, W. C. Price, W. E. Seeds, and G. R. Wilkinson. *Optical Society of America, Journal*, v. 48, Apr. 1958, p. 249-254.

Instrument suitable for the examination of fibers, small crystals, and microsamples is based on a double-beam-intime system and involves a precision stage movement which inserts sample and reference alternately into the beam.

11054 Some High-Pressure, High-Temperature Apparatus Design Considerations: Equipment for Use at 100,000 Atmospheres and 3000°C. H. Tracy Hall. *Review of Scientific Instruments*, v. 29, Apr. 1958, p. 267-275.

Details of a simple-piston and cylinder device for pressures to 50,000 atm. with temperatures of 5000 C, a tetrahedral-anvil device that has been successfully tested at 100,000 atm. and 3,000 C, and a stepped-piston device capable of developing pressures to 200,000 atm. at room temperature.

11055 Spectral Effects in the Comparison of Scintillators and Photomultipliers. Robert K. Swank, Warren L. Buck, F. Newton Hayes, and Donald G. Ott. *Review of Scientific Instruments*, v. 29, Apr. 1958, p. 279-284.

11056 Field Desorption by Alternating Fields. An Improved Technique for Field Emission Microscopy. Earl C. Cooper and Erwin W. Müller. *Review of Scientific Instruments*, v. 29, Apr. 1958, p. 309-312.

Yields additional information on adsorption systems and easily produces clean surfaces of metal tips without heat.

11057* Optical Tracking Instrumentation. A. H. Schendel. *Society of Motion Picture and Television Engineers, Journal*, v. 67, pt. 1, Apr. 1958, p. 237-241.

11058 A Study of Temperature Measurement in a Solar Furnace. Byron B. Brenden, Herbert W. Newkirk, Jr., and Sidney H. Woodcock. *Solar Energy*, v. 2, no. 1, Jan. 1958, p. 13-17.

Thermocouples and two-color pyrometers can be used to accurately measure the temperature of a specimen being heated in a solar furnace from room temperature to 3500 C.

11059 A Portable High-Resolution Grating-Echelle Spectrograph. C. Petty and G. H. Dieke. *U. S. Atomic Energy Commission, LA*-2151, May 5, 1958, 41 pp. (UF767 U3.La Contin.)

Instrument is suitable for field use. The spectrum between 2000 and 9500 A is photographed on three 16-in. long plates, with a dispersion varying between 0.18 to 0.89 A/mm. corresponding to the 1090th to 229th order of the echelle.

11060* (German.) Slide Rule for Converting Molar Percents Into Weight Percents, and Vice Versa, in Binary and Complex Systems. **Rechenschieber zur Umwandlung von Molprozenten in Gewichtsprozente und umgekehrt in Zwei- und Mehrstoffsystemen.** Helmut Bückle. *Zeitschrift für Metallkunde*, v. 49, no. 3, Mar. 1958, p. 144-146.

See also: **10517** (applications of X-ray analysis conference); **10741** (brittle lacquer applications); **10796** (instrumentation and systems engineering); **10850** (semiconductor thermocouples).

LUBRICATION AND FRICTION

11061* Bearings for Aircraft Hydraulic Pumps. W. S. Bobier, Jr. and C. R. Potter. *Applied Hydraulics*, v. 11, May 1958, p. 108-110.

Speed and pressure effects; type selection procedure.

11062 The Effect of Heat Conductance on Slider-Bearing Characteristics. W. H. Guilinger and E. A. Saibel. *ASME, Transactions*, v. 80, no. 4, May 1958, p. 800-806.

The slider bearing without side leakage is considered when heat generated in the oil film may be conducted in the fluid as well as lost to the surroundings.

11063 Influence of Load and Thermal Distortion on the Design of Large Thrust Bearings. R. A. Baudry, E. C. Kuhn, and W. W. Wise. *ASME, Transactions*, v. 80, no. 4, May 1958, p. 807-818.

Describes some design considerations given to vertical water-wheel-generator thrust bearings in order to avoid highly concentrated loading during the starting period, and to obtain minimum distortion of the pad during operation at normal speed and load.

11064 Theoretical and Experimental Analysis of Hydrodynamic Gas-Lubricated Journal Bearings. B. Sternlicht and R. C. Elwell. *ASME, Transactions*, v. 80, no. 4, May 1958, p. 865-878.

Presents a numerical solution for finite-width journal bearings and results of experiments conducted with air-lubricated hydrodynamic journal bearings. Comparison is made between theoretical and experimental results. Design formulas and recommendations for future studies also are included.

11065 Resistance to Rolling and Sliding. A. C. Dunk and A. S. Hall, Jr. *ASME, Transactions*, v. 80, no. 4, May 1958, p. 915-920.

Effects of velocity on the inclination, and the offset of the line of action of the resultant force between two disks in peripheral contact.

11066 The Mechanical Wear of Metals. W. Hirst. *British Journal of Applied Physics*, v. 9, Apr. 1958, p. 125-132.

Design of fundamental experiments for examining the wear phenomena encountered in the conditions of speed and loading of industrial machines. Apparatus in which nominal point or nominal line contact can be maintained indefinitely; phenomena observed when a lubrication is maintained up to very heavy loads; a method of measuring the thickness of the oil film in line contact conditions is outlined and some results given.

11067* An Application of Radioisotope Wear Study Techniques. Charles C. Gambill. *General Motors Engineering Journal*, v. 5, no. 2, Apr.-May-June 1958, p. 21-25.

Techniques for finding otherwise-undetectable amounts of wear in a refrigeration system compressor.

11068* Influence of Load on Liner Temperature and Wear in a High Speed Diesel Engine. M. R. K. Rao and K. N. Murthy. *Indian Institute of Science, Journal*, v. 40, sec. B, no. 1, Jan. 1958, p. 1-10 + 1 plate.

Tests showed that engines running on varying loads suffered more wear than engines running on full load.

11069* (Russian.) The Effect of Lubricating Oils on the Wear of Bearings. **O vliianii smazochnykh materialov na iznos podshipnikov kacheniia.** V. A. Vishniakov, G. V. Vinogradov, and V. P. Pavlov. *Khimiia i Tekhnologiia, Topliv i Masel*, v. 3, no. 4, Apr. 1958, p. 26-32.

11070* Petroleum Lubricants—Their Application in Nuclear Plant. C. H. Nailer. *Nuclear Engineering*, v. 3, no. 26, May 1958, p. 203-206.

Reviews the general application of petroleum-based oils and greases to meet the arduous conditions imposed by radiation and the suitability of certain types of lubricants.

11071 Roll-Neck Bearing Lubrication for Rubber and Plastics Calenders. K. J. Gooch and W. C. Whittum. *Plastics Technology*, v. 4, Apr. 1958, p. 339-343.

Tests on bronzes, Al, and babbitt show that the preferred bearing liner material is dependent upon many factors, including loading, speed, temperature, hardness of journal, type of lubrication, and possible presence of dirt. As operating temperatures increase into the 400-500 F range, oil viscosity becomes highly important.

11072* High-Temperature Bearings Will Roll With Advances in Lubricants, Materials, Design. *SAE Journal*, v. 66, Apr. 1958, p. 28-33.

Mechanical tests used to screen new greases; lubrication of steel surfaces by powdered solids in low speed sliding; new material requirements and design problems; physical tests used in material selection.

11073 Symposiums on Railroad Materials and Lubricating Oils. 169 pp. 1957. American Society for Testing Materials, Philadelphia. (TF340 Am35r)

Papers deal with performance of diesel engines; railroad cleaning materials; and specifications, standard test methods, and recommended practices in the field of petroleum products and lubricants.

11074 Relation of Journal Bearing Performance to Minimum Oil-Film Thickness. F. W. Ocvirk and G. B. DuBois. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4223, Apr. 1958, 48 pp. (TL570 Un3t Vis.)

See also: **10483** (determination of Zr in lube oils); **10756** (Teflon films as lubricant); **11245** (rolling-contact fatigue spin rig).

MECHANICAL ENGINEERING

11075* (German.) Stress Field Due to Load Tension in the Leg of a T-Shaped Flat Bar. **Das Spannungsfeld im Streifen eines zugbeanspruchten T-förmigen Flachstabes.** I. Huszár. *Acta Technica Academiae Scientiarum Hungaricae*, v. 19, nos. 3-4, 1958, p. 333-352.

Stress analysis was carried out by means of the fundamental equations of elasticity. The transmission was considered as elastic and the missing stresses between the head and the leg were determined by photoelasticity, and with it, the Airy stress function.

11076* (Russian.) Design of Off Shore Oil Well Drilling Structures of Open Construction Considering Effect of Sea Waves. **O raschete morskikh neftepromyslovykh gidrotekhnicheskikh sooruzhenii skvoznoi konstruktsii na deistvie morskikh voln.** I. P. Kuliev. *Akademiia Nauk Azerbaidzhanskoi SSR, Doklady*, v. 14, no. 4, 1958, p. 287-290.

11077 Statics and Dynamics of a Helical Spring. Ronald Geballe. *American Journal of Physics*, v. 26, no. 5, May 1958, p. 287-290.

The theory of the extension and twisting of a helical spring is reviewed and its applicability as an experiment in advanced mechanics is described. The experiment provides an excellent demonstration of the geometry and elastic deformation of a helix, its static equilibrium, and its coupled oscillations.

11078* New Pump Design Promises Low Weight per Horsepower. John W. Houser. *Applied Hydraulics*, v. 11, May 1958, p. 65-67.

A new pump being developed at the Naval Air Development Center in Johnsville promises increased flow and power per unit of weight and volume over that available from other pumps. Although shape of the pumping elements is unconventional and perhaps not well described by terms like piston and cylinder, the high flow, low weight and small size of the pump are the result of double-acting piston and cylinder construction.

11079 Friction Materials—Today and Tomorrow. Andrew W. Shearer. *Automotive Industries*, v. 118, no. 7, Apr. 1, 1958, p. 62 + 7 pages.

Important elements in selection of friction materials for automotive vehicles include coefficient of friction, wear resistance, and smooth and quiet operation. Types of friction materials, their characteristics, applications, and trends in the field today are discussed.

11080* Thermal Stresses Caused by Heating Thick-Walled Hollow Cylinders. *Brown Boveri Review*, v. 45, no. 1, Jan. 1958, p. 21-28.

In the present article the thermal stresses in thick-walled hollow cylinders of infinite length are given for the cases of the temperature of the medium inside or surrounding being raised suddenly or steadily according to a linear function. The thermal stresses in a solid cylinder and a flat plate appear as special cases. The results of the analysis are reproduced in nondimensional diagrams. Thus the starting schedule of a turbine can be specified which, for the shortest possible starting time, ensures that the stresses do not exceed an admissible maximum value.

11081* Transverse Bending of Infinite and Semi-Infinite Thin Elastic Plates. III. W. A. Bassali and M. Nassif. *Cambridge Philosophical Society, Proceedings*, v. 54, pt. 2, Apr. 1958, p. 288-299.

11082 Design of Piping for Flexibility With "Flex-Anal" Charts. 7th Rev. Ed. 100 pp. Blaw-Knox Co., Pittsburgh. (TJ415 B61p7 Over.)

Data enabling the experienced pipe design engineer to accurately analyze most piping systems in a few hours which formerly required many days or weeks.

11083* (Hungarian.) Selecting a Flywheel for Rolling-Mill Trains. **Hengersorok lendítőkerekének megválasztása.** Ervin Kiss. *Kohászati Lapok*, v. 13, nos. 2-3, Feb.-Mar. 1958, p. 131-135.

Choice, control, and calculation of the loss of power of a flywheel.

11084 Essential Properties of Nylon Tubing for Pressure Applications. R. B. Koch. *Machine Design*, v. 30, May 1, 1958, p. 123-126.

An analysis of design qualifications, performance characteristics, and specification criteria of nylon pressure tubing for gas or liquid applications.

11085 Mechanical Vibrations. Austin H. Church. 275 pp. 1957. John Wiley and Sons, New York. (TA355 C47m)

A concise treatment of the basic principles of vibration analysis, with emphasis on their practical applications.

11086 Selection of Steels for Springs. H. J. Elmendorf. *Metal Progress*, v. 73, no. 4, Apr. 1958, p. 80-84.

The mechanical properties of spring wire and springs are related; by knowing the wire tensile strength, the spring design stress can be predicted and the proper spring steel can be selected.

11087 Society for Experimental Stress Analysis, Proceedings (Annual Volume), v. 15, no. 2, 1958, 178 pp. Society of Experimental Stress Analysis, Cambridge, Mass. (TG265 Sol3p Vis.)

Seventeen papers including high temperature fatigue testing of gas turbine buckets, rosette analysis, properties of stresscoat, stress diffusion problems, dynamic tests of propeller blades in vacuo, waterproofing bonded wire strain gages, and thermal stress fatigue.

11088 (Czech.) Bending Strain in Plates With Symmetrical System of Holes. **Ohyb desky s pravidelným polem otvorů.** C. Höschl. *Strojírenství*, v. 8, no. 4, Apr. 1958, p. 243-249.

When bending strain of a plate with symmetrically located holes is to be computed, a solid, homogeneous plate is generally substituted for a perforated one, and a correcting coefficient for reduced bending strength is introduced into the formulas. This article deals with theoretical justification of a simplified method and explains differences among various formulas adopted by various authors for expressing reduced strength. Theoretical deductions are applied to practical problems. Special attention is paid to calculation of face plates of tubular vessels.

11089 Non-Linear Bending and Buckling of Circular Plates. Herbert B. Keller and Edward L. Reiss. *U. S. Atomic Energy Commission, NYO*-7978, Feb. 1, 1958, 46 pp. (UF767 Un3ny Contin.)

An iterative method for solving certain boundary value problems was developed and applied to obtain numerical solutions of the von Kármán plate equations for a variety of bending and buckling problems.

11090 Plastic Strain Absorption as a Criterion for High Temperature Design. C. R. Kennedy and D. A. Douglas. *U. S. Atomic Energy Commission, ORNL*-2360, May 2, 1958, 25 pp. (UF767 U3o Contin.)

11091 Stability of Cylindrical and Conical Shells of Circular Cross Section, With Simultaneous Action of Axial Compression and External Normal Pressure. Kh. M. Mushtari and A. V. Sachenkov. *U. S. National Advisory Committee for Aeronautics, Technical Memorandum* 1433, Apr. 1958, 15 pp. (Translated from *Prikladnaia Matematika i Mekhanika*, v. 18, no. 6, Nov.-Dec. 1954, p. 667-674.) (TL570 Untm Vis.)

11092* (Russian.) Design of Rational Mechanisms. **Konstruirovani ratsional'nykh mekhanizmov.** L. N. Reshetov. *Vestnik Mashinostroeniia*, v. 38, no. 5, May 1958, p. 3-10.

A study of kinematic couples. Design of rotary and sliding mechanisms and linkages.

11093* (Russian.) Resilient Deformation in Hydraulic Press Systems. **Uprugaia deformatsiia v sistemakh gidravlicheskikh pressov.** A. I. Zimin and N. S. Dobrinskii. *Vestnik Mashinostroeniia*, v. 38, no. 5, May 1958, p. 19-23.

Calculation of stresses, flow characteristics, and energy relationships.

See also: **11223** (strength of high pressure vessels).

METALLURGY

11094* (French.) Precision Metallurgy of Iron, Nickel or Chromium Base Alloys. **La métallurgie de précision des alliages à base de fer, de nickel ou de chrome.** A. Villachon. *Âge Nucléaire*, 1958, no. 9, Mar.-Apr., p. 87-98.

A survey of alloys possessing a controlled physical property such as definite expansion, elastic, electrical, or magnetic properties. Oriented Fe-Si; oriented Fe-Ni with 50% Ni. Magnetostriction. Application to electronics and nuclear science.

11095* Magnesium and Its Alloys. R. Westwood. *Australasian Engineer*, 1958, Mar. 7, p. 63-68.

A general survey.

11096 New Alloy Steels Beat Process Bugaboos. D. B. Roach and A. M. Hall. *Chemical Engineering*, v. 65, May 19, 1958, p. 180 + 2 pages.

Low-carbon steels have superior resistance to intergranular corrosion and good resistance to oxidation, but tensile strength is sacrificed. Properties of low Ni, high Mn, and new stabilized grades of stainless steels are discussed.

11097 Industrial Scrap Generation. 35 pp. 1957. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (HD9975 Un3.14i)

A statistical study of the generation of Fe and steel, Cu, and Al scrap in metal-consuming manufacturing industries, based on a survey showing, industry by industry, ratios of scrap generation to metals consumption in 1954.

11098* Materials for Superheater Tubes and Supports. D. W. Crancher. *Institute of Marine Engineers, Transactions*, v. 70, Mar. 1958, p. 77-103.

Properties of available materials. The problem of steam and flue gas corrosion.

11099 Some Investigations on Plutonium Metal. E. Dempsey and A. E. Kay. *Institute of Metals, Journal*, v. 86, pt. 8, Apr. 1958, p. 379-384.

Effects of natural decay and the specific heat of α-Pu are discussed. Oxidation of Pu in air is investigated in order to gain an over-all impression of the behavior of the metal.

11100 Creep-Resistant Steels. E. Smith and J. Nutting. *Iron & Steel*, v. 31, no. 6, May 1958, p. 226-235.

Effects of tempering on some types containing Cr, Mo, and V.

11101 Low-Carbon Bainitic Steels. K. J. Irvine and F. B. Pickering. *Iron & Steel*, v. 31, no. 6, May 1958, p. 235-247.

11102 A Columbium Primer. Chester T. Sims. *Journal of Metals*, v. 10, May 1958, p. 340-345.

Interest in metallic Cb and in Cb-base alloys is increasing rapidly due to their excellent potential for use at high temperatures in atomic energy and missile or jet-engine applications. Occurrence, extraction, preparation, vacuum purification, fabrication, properties, alloying behavior, oxidation, and present and future uses.

11103 Current Trends in Metal Science and Future Developments in Aluminum Metallurgy. George J. Mills. *Light Metal Age*, v. 57, Apr. 1958, p. 11-14.

Effects of dislocations, impurities, abnormal grain growth, age hardening, and corrosion on properties. Dislocation strengthening. Raising the elastic modulus by dispersed phase hardening. Work softening.

11104 (Dutch.) Aluminum Copper Malleable Alloys. **Aluminiumkoper kneedlegeringen.** W. R. G. de Jager. *Metaalinstituut T.N.O., Publikatie* 52, Feb. 1958, 18 pp. + 4 plates. (TN603 M56p Contin.)

Characteristics of Al bronzes standardized in several countries. Discussion of various alloys as marketed by leading manufacturers.

11105 Alloys of Titanium and Zirconium Containing Tin. R. F. Smart. *Metallurgia*, v. 57, Apr. 1958, p. 181-188.

Effects of Sn on Ti and Zr; properties of the alloys; constitution diagram.

11106 Metallurgical Defects in High Speed Steels. E. Niesielski. *Metallurgia*, v. 57, May 1958, p. 233-245.

Following a brief reference of the requirements of a cutting tool, and of the control necessary to ensure their being met, the author describes the various defects—apart from common defects such as piping, non-metallic inclusions, etc.—which arise in high speed steels during steel-making, heat-treatment, and tool processing.

11107* (Italian.) Metallurgical Problems of Engineering Materials for Atomic Power Reactors. **Problemi metallurgici relativi ai materiali strutturali per impianti nucleari.** A. Erra and P. L. Lensi. *Metallurgia Italiana*, v. 50, no. 2, Feb. 1958, p. 45-49.

Behavior of materials going into the reactor container. Effects of radiation on mechanical and metallurgical properties.

11108 The Metallurgy of Vanadium. William Rostoker. 185 pp. 1958. John Wiley & Sons, New York. (TN799.V2 R73m)

Discusses extractive metallurgy, physical properties, alloy systems, mechanical properties, technology, oxidation, corrosion and embrittlement, metallography, and V as an alloy addition.

11109 Titanium Production Developments Including Metallurgy and Alloying. R. I. Jaffee. *North Atlantic Treaty Organization, AGARD Report No.* 94, Apr. 1957, 89 pp. (TL565 Ag11r Vis.)

The past, present, and future of the Ti industry is discussed in terms of costs and quantities of the metal produced. The nature and extent of present Ti ore reserves are described as are the relative merits and disadvantages of the present extractive metallurgical processes being used for primary metal production. Descriptions are given of the various methods in use for the melting, casting, and fabrication of Ti and its alloys. Techniques of descaling, finishing, joining, and machining are also reviewed. The physical, chemical, and mechanical properties of current commercial alloys are summarized. The principles applying to the physical metallurgy of Ti and its alloys are also described.

11110* (Polish.) Low Copper Manganese Brasses. **Niskomiedziowe mosiądze manganowe.** Krzysztof Rutkowski and Zbigniew Górny. *Prace Instytutu Odlewnictwa*, v. 7, no. 2, 1957, p. 115-139.

Properties, structure, production technology, and uses of alloys containing: Cu below 50%, Mn up to 5%, Fe up to 1.8%, and Pb up to 5.0%.

11111* (Polish.) Casting Alloys From Magnesium Scrap. **Odlewnicze stopy magnezu ze złomu.** Zbigniew Lech and Kazimierz Korecki. *Prace Instytutu Odlewnictwa*, v. 7, no. 2, 1957, p. 156-172.

Effect of metallic (Fe, Cu, Si, Ni, and Sn) and non-metallic inclusions, which may pass into metal obtained by remelting scrap, on the properties of casting alloys. The main conditions assuring high quality of alloys from scrap are proper sorting and remelting.

11112* (Russian.) Manganese Copper–Nickel, a Highly Stable Copper Alloy. **Margantsovyi mel'khior—vysokoprochnyi mednyi splav.** A. V. Bobylev. *Priborostroenie*, 1958, no. 3, Mar., p. 22-24.

Mechanical properties under different working conditions .

11113 Casting Alloy Enters High-Strength Field. E. G. Opsahl and W. H. Sparing. *Product Engineering*, v. 29, no. 17, Apr. 28, 1958, p. 84-85.

"Wearpact", made by adding B and rare earths to a low-alloy steel, offers advantages in cost and easier fabrication. Properties and design tips are given.

11114* (French.) Chromium and Ferro-Chromium for Special Steels. **Le chrome et le ferro-chrome pour les aciers spéciaux.** Ch. Dingeon. *Revue de Métallurgie*, v. 55, no. 1, Jan. 1958, p. 1-8.

Producing ferro-chromium with lower C contents. Replacing C with Si due to the low solubility of C in silicides. The C contents of the ferro-chromium ranged from 2 to $<0.02\%$.

11115 Story of 2nd World Metallurgical Congress Held in the United States of America, October-November, 1957. Kingsley W. Given, editor. 225 pp. 1958. American Society for Metals, Cleveland. (TN607 W89s)

A review of conference activities including brief digests of the discussions on steelmaking and refining, nonferrous refining and fabrication, heat treatment, welding and joining, inspection and testing, metallurgical research and education, and metallurgical aspects of atomic energy.

11116 Fabrication of Aluminum - Plutonium Fuel Elements for Lattice Tests in Support of PRTR. W. J. Bailey, R. K. Koler, and D. A. Patterson. *U. S. Atomic Energy Commission, HW*-51855, Jan. 3, 1958, 32 pp. (UF767 Un3.1hw Contin.)

Control of α contamination in fabricating Pu-bearing fuel elements and the casting of long, thin fuel rods are discussed.

11117 Evaluation of Welded and Seamless Zirconium and Zircaloy-2 Tubing. Interim Report - Initial Metal Preparation and Seamless Tube Fabrication and Testing. S. H. Bush. *U. S. Atomic Energy Commission, HW*-54932, Feb. 10, 1958, 28 pp. (UF767 Un3.1hw Contin.)

11118 The Metallurgy and Fabrication of Uranium-Alloy Fuel Elements. R. W. Dayton. Paper from "Fuel Elements Conference, Paris, November 18-23, 1957". *U. S. Atomic Energy Commission, TID*-7546, Mar. 1958, p. 302-365. (UF767 Un3ti Contin.)

The alloys considered are Zr with 45 to 55 wt. % U, Zr with 20 wt. % U, U with 10 to 20 wt. % Mo or Nb. U with 5 wt. % Zr and 1.5 wt. % Nb. and U with 3.8 wt. % Si. Fabrication methods discussed are induction and arc melting for alloy preparation and brazing, roll bonding, and pressure bonding for cladding. Constitutional diagrams and properties are also included.

See also: **10917** (transistor technology); **11404** (dispersion fuel alloys); **11416** (fabrication and properties of nuclear fuel elements); **11583** (weldable Ti alloys).

METALS—CORROSION

11119* (German.) Changes of Structure and Manufacturing Faults Caused by Scaling in Hot-Rolled Bz5 Bronze. **Durch Zunderbildung verursachte Gefügeveränderungen und technologische Fehler in der warmgewalzten Bronze Bz 5.** Z. Hegedüs. *Acta Technica Academiae Scientiarum Hungaricae*, v. 19, nos. 3-4, 1958, p. 363-369.

Effect of de-tinning of the surface and formation of SnO_2 in the atmosphere of the oxidizing furnace, on the formation of surface cracks at the first hot rolling passes. Description of the scale formation. Effect of homogenization temperature and time.

11120* (French.) Refractory Alloys for Aeronautical Gas Turbines and Their Corrosion. **Les alliages réfractaires pour turbines à gaz aéronautiques et leur corrosion.** Marcel Mathieu. *Âge Nucléaire*, 1958, no. 9, Mar.-Apr., p. 77-86.

Quality requirements of refractory metals used for gas turbines. The modified heat resistant Ni-Cr 80/20 alloys. Co-Cr based alloys. Dry corrosion; scaling. Corrosion of Co-base alloys.

11121* (Russian.) The Kinetics of the Formation of Oxide Films on Tungsten and Molybdenum. **K kinetike protsessov obrazovaniia okisnykh plenok na vol'frame i molibdene.** V. A. Arslambekov and K. M. Gorbunova. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 294-297.

11122* (Italian.) Electron Microscope Examination of an Oxide Film Layer Obtained From the Hot Oxidation of Aluminum. **Esame al microscopio elettronico di film di ossido ottenuti su alluminio per ossidazione a caldo.** M. Paganelli. *Alluminio*, v. 27, no. 4, Apr. 1958, p. 159-164.

The layer which appears on Al from annealing at about 620 C is composed of γ-Al_2O_3 cubic spinel.

11123* (German.) The Scaling Rate of Pure Iron in Oxygen at Reduced Pressures and in Carbon Dioxide. **Die Verzunderungsgeschwindigkeit von reinem Eisen in Sauerstoff bei verminderten Drücken und in Kohlendioxyd.** Norbert G. Schmahl, Hans Baumann, and Hermann Schenck. *Archiv für das Eisenhüttenwesen*, v. 29, no. 3, Mar. 1958, p. 147-152.

Scaling rate of electrolytic Fe in 0 at 950 C from 2 to 760 mm. Effect of the 0 pressure on the parabolic law. Scaling tests of pure Fe with CO_2 at 950 and 981 C. Comparison with other results.

11124 Intergranular Corrosion Resistance of Austenitic Stainless Steels. A Ferric Sulfate-Sulfuric Acid Test. Michael A. Streicher. *ASTM Bulletin*, 1958, no. 229, Apr., p. 77-86.

Test is specific for intergranular attack associated with carbide precipitation in unstabilized steels, takes only 120 hr, utilizes simple flask and condenser apparatus, and permits testing of several specimens in the same flask.

11125* (Russian.) Effect of α-Activity on the Corrosion Rates of Platinum and Zirconium in Hydrobromic Acid. **Vliianie α-aktivnosti na skorost' korrozii platiny i tsirkoniia v bromistovodorodnoi kislote.** D. M. Ziv and I. A. Efros. *Atomnaia Energiia*, v. 4, no. 3, Mar. 1958, p. 293-294.

11126* Fretting Corrosion of Cast Iron. F. T. Barwell and K. H. R. Wright. *B. C. I. R. A. Journal of Research and Development*, v. 7, no. 5, Apr. 1958, p. 190-202 + 12 plates.

Results show that lubricated cast iron specimens in the as-cast condition exhibit less susceptibility to fretting than the annealed specimens.

11127* The Influence of Silicon Content on the Growth and Scaling Resistance of Cast Iron With Nodular Graphite. R. J. Maitland and I. C. H. Hughes. *B. C. I. R. A. Journal of Research and Development*, v. 7, no. 5, Apr. 1958, p. 203-223 + 19 plates.

Both growth and scaling proceed relatively slowly and are inhibited by increasing Si contents at temperatures below the austenite transformation range. When the critical temperature range is exceeded or nearly exceeded, growth and scaling become excessive and in this field Si seems to promote this.

11128 High Temperature Oxidation of Iron-Nickel Alloys. M. J. Brabers and C. E. Birchenall. *Corrosion*, v. 14, Apr. 1958, p. 33-36.

Alloys of several compositions were oxidized in 0 at 1050 C. An oxidation mechanism is proposed and part of the ternary phase diagram is given.

11129 A New Dynamic Test Facility for Aqueous Corrosion Studies. S. Greenberg, J. E. Draley, and W. E. Ruther. *Corrosion*, v. 14, Apr. 1958, p. 45-46.

A high pressure, high temperature dynamic aqueous corrosion test loop is described. Maximum design operating conditions are 360 C, 3000 psia, and 20-30 ft/sec velocity past test specimens.

11130 Corrosion Rates of Mild Steel in NH_4NO_3-NH_3-H_2O Solutions. Norman Hackerman, Ray M. Hurd, and Earl S. Snavely. *Corrosion*, v. 14, Apr. 1958, p. 57-59.

The effects of various S and As- containing inhibitors were studied, with particular emphasis on NH_4CNS.

11131 Methods for Increasing the Corrosion Resistance of Metal Alloys. N. D. Tomashov. *Corrosion*, v. 14, May 1958, p. 39-46.

11132 The Mechanism of Stress Corrosion of Austenitic Stainless Steels in Hot Aqueous Chloride Solutions. K. W. Leu and J. N. Helle. *Corrosion*, v. 14, May 1958, p. 59-64.

The investigation proves that the initial corrosive attack is dependent primarily on the mechanical and chemical behavior of the passivating film already present on the steel or formed during exposure to the corrosive medium, and only to a minor extent on the structure of the metal itself.

11133* (French.) Stress Corrosion of Aluminum Alloys. **La corrosion sous tension des alliages d'aluminium.** F. A. Champion. *Corrosion et Anticorrosion*, v. 6, no. 4, Apr. 1958, p. 132-140.

Definition of stress corrosion. Rupture mechanism. Types of stresses used. Al alloys without true sensitivity to stress corrosion. Laboratory tests and outside tests. Protective measures.

11134 Vapour-Phase Corrosion Inhibitors. S. Rowden. *Corrosion Technology*, v. 5, Apr. 1958, p. 117 + 5 pages.

The most important class of chemical agents used function by changing the electrochemical processes occurring at the metallic surfaces.

11135 Corrosion of Anodically and Cathodically Polarized Magnesium in Aqueous Media. G. R. Hoey and M. Cohen. *Electrochemical Society, Journal*, v. 105, May 1958, p. 245-250.

Effect of current density, *pH*, and temperature on the electrode behavior and corrosion of Mg in aqueous solutions.

11136 Corrosion of the Zinc Electrode in the Silver-Zinc-Alkali Cell. T. P. Dirkse and Frank De Haan. *Electrochemical Society, Journal*, v. 105, June 1958, p. 311-315.

Cells containing 30% KOH as electrolyte were used and kept at room temperature. Special attention was centered on open circuit or stand conditions. This corrosion is affected primarily by O and by dissolved Ag_2O.

11137 Diffusion of Oxygen in Zirconium and Its Relation to Oxidation and Corrosion. J. Paul Pemsler. *Electrochemical Society, Journal*, v. 105, June 1958, p. 315-322.

The diffusion has been studied in the temperature range of 400 to 585 C by observing the rates of dissolution of anodically deposited interference oxide films. The diffusion coefficient of O in Zr depends on the grain orientation and varies by a factor of two among different orientations.

11138 Chemical Factors Affecting Stress Corrosion Cracking of 18-8 Stainless Steels. H. H. Uhlig and John Lincoln, Jr. *Electrochemical Society, Journal*, v. 105, June 1958, p. 325-332.

Transgranular stress corrosion cracking of 18-8 Type 304 specimens in boiling 42% $MgCl_2$ does not depend on rate of stressing ($<$ 1 sec. to 10 min.) or on small variations in degree of plastic deformation. Addition of HCl to $MgCl_2$ decreases cracking time whereas addition of NaOH increases the time. Pre-exposure of unstressed specimens to $MgCl_2$ slightly decreases cracking times of the same specimens subsequently stressed. Cracks occur along sheared edges of unstressed specimens despite stress relief anneal at 375 C for 2-hr.

11139* (German.) Latest Results in the Field of Rust Protection in Gas and Coking Plants. **Neuere Ergebnisse auf dem Gebiet des Rostschutzes in Gaswerken und Kokereibetrieben.** Karl Krenkler. *GWF: Gas- und Wasserfach* (Gas), v. 99, no. 13, Mar. 28, 1958, p. 293-300.

11140 The Acetic Acid Salt Spray Test. J. H. Hooper. *Institute of Metal Finishing, Bulletin*, v. 8, no. 1, Spring 1958, p. 79-90.

The 1% acetic acid-5% salt spray test is compared with other accelerated methods for evaluating the corrosion resistance of anodized Al and Cr-Ni-Cu systems on steel, Zn, and Cu basis materials.

11141* (Russian.) The Corrosion Behavior of Chromium-Nickel Steels in Concentrated Solutions of Sulfuric Acid. **Korrozionnoe povedenie khromonikelevykh stalei v kontsentrirovannykh rastvorakh sernoi kisloty.** V. I. Ginzburg. *Khimicheskaia Promyshlennost'*, 1958, no. 1, Jan.-Feb. p. 37-42.

The steels Kh18N9T(EIal-T), 1Kh18N12M2T(EI171, EI448), EI530 and carbon steel were analyzed in concentrated H_2SO_4 media under various conditions. Effect of basic external factors on the corrosion reaction was determined.

11142* (German.) The Corrosion Behavior of Artificially Prepared Hard-Zinc Layers. **Das Korrosionsverhalten künstlich erzeugter Hartzinkschichten.** W. Rädeker. *Metalloberfläche*, v. 12, no. 4, Apr. 1958, p. 102-104.

Possibilities of increasing the corrosion resistance of Zn coatings by annealing above 330 C. Atmospheric and other corrosion tests.

11143 Accelerated High Temperature Oxidation Due to Vanadium Pentoxide. K. Sachs. *Metallurgia*, v. 57, Apr. 1958, p. 167-173; May 1958, p. 224-232.

Mechanism of V_2O_5 attack; secondary effects. Aspects of the problem of V_2O_5 in residual fuel ash of gas turbines.

11144* (French.) Combating Corrosion in the Oil Industry. **La lutte contre la corrosion dans l'industrie du pétrole.** J. Tourret. *Métallurgie et la Construction Mécanique*, v. 90, Apr. 1958, p. 285 + 3 pages.

Difficulties proper to the oil industry. Task of the anti-corrosion engineer in a company of several factories. Control methods and devices used.

11145 Use Lead to Control Refinery Corrosion. Edward J. Mullarkey. *Petroleum Refiner*, v. 37, Apr. 1958, p. 201-206.

Latest practices in Pb construction explain how to avoid difficulties experienced with lead-lined equipment.

11146* (Swedish.) Stress Corrosion. **Spänningskorrosion.** Stig Berg. *Teknisk Ukeblad*, v. 105, no. 15, Apr. 10, 1958, p. 323-331.

Several types of corrosion. Theory of corrosion mechanism. Stress corrosion in austenitic stainless steel. Propagation of the corrosive fracture beyond the passive layer. Corrosion in $CaCl_2$ and $MgCl_2$.

11147* (Russian.) Determination of the Moisture Film Thickness on Metals in Atmospheric Corrosion. **Opredelenie tolshchiny plenki vlagi na metallakh pri atmosfernoi korrozii.** N. D. Tomashov and A. A. Lokotilov. *Zavodskaia Laboratoriia*, v. 24, no. 4, 1958, p. 425-427.

11148* (Russian.) Testing Corrosion Resistance of Aluminum in 98% HNO_3. **Ob ispytaniiakh korrozionnoi stoikosti aliuminiia v 98% azotnoi kislote.** M. N. Vitkovskii and V. A. Maslov. *Zavodskaia Laboratoriia*, v. 24, no. 4, 1958, p. 429-430.

11149* (Russian.) Study of the Rate of Dissolution of the Oxide Film on Aluminum. **Izuchenie skorosti rastvoreniia okisnoi plenki na aliuminii.** N. P. Fedot'ev and I. Kosha-Shomodi. *Zhurnal Prikladnoi Khimii*, v. 31, no. 3, Mar. 1958, p. 497-500.

See also: **10745** (oxidation of enameled iron); **10762** (atmospheric corrosion of painted metals); **10835** (corrosion behavior of Sn-Ni deposits on steel); **11380** (corrosion in nuclear reactors).

METALS—EXTRACTION AND REFINING

11150* (Russian.) On Selecting the Frequency of Devices for Electromagnetically Mixing Metal in an Electric Furnace. **O vybore chastoty ustroistv dlia elektromagnitnogo peremeshivaniia metalla v elektropechi.** G. S. Vainberg. *Elektrichestvo*, 1958, no. 5, May, p. 20-23.

11151 Oxygen and the Steel Plant. J. H. Strassburger. *Iron and Steel Engineer*, v. 35, May 1958, p. 69-71.

Followed by five other papers on O utilization and economics.

11152 Designing a Large Tonnage Continuous Casting Plant. H. E. Skelley and Rufus Easton. *Iron and Steel Engineer*, v. 35, May 1958, p. 131-142.

Summarizes factors to be considered, including basis for design, continuous casting machine design, open hearth shop, converter shop, and capital equipment comparison.

11153 Humidified Blast Furnace Operation. Richard J. Wilson. *Journal of Metals*, v. 10, Apr. 1958, p. 268-271.

Use of moisture in the blast in conjunction with compensating increases in blast temperature resulted in an improvement in hearth temperature control and an increase in the driving rate.

11154 Carbon Monoxide Reduction of Iron Ore. Otto Stelling. *Journal of Metals*, v. 10, Apr. 1958, p. 290-295.

Continuous non-melting reduction process makes use of CO in a fluidized bed.

11155* (French.) New IRSID Process for Refining Phosphorus-Containing Irons Using Pure Oxygen and Lime Powder. **Nouveau procédé IRSID d'affinage des fontes phosphoreuses à l'oxygène pur et à la poudre de chaux.** B. Trentini and M. Allard. *Revue de Métallurgie*, v. 55, no. 1, Jan. 1958, p. 67-74.

Process is characterized by complete change in the behavior of the O impinging on the surface of the bath, due to precise control of a finely divided lime carried by the O.

11156* (French.) Basic Bessemer Steel With Interrupted Effervescence Obtained by Mechanical Capping. **Acier Thomas à effervescence interrompue par coiffage mécanique.** J. Duflot, P. Mathieu, and A. Richard. *Revue de Métallurgie*, v. 55, no. 3, Mar. 1958, p. 275-300.

Production of capped ingots with only 110 g. per ton of Al. With a 2 min. contact of the cap, the piping of the head is only 2%; the head bloom is markedly stabilized and mechanical and chemical properties are more uniform.

11157* (German.) Operational Results Obtained When Blowing Basic Converter Heats by Means of the IRSID Opacimeter. **Betriebsergebnisse beim Erblasen von Thomasschmelzen mit dem IRSID-Opazimeter.** Hans vom Ende and Gustav Mahn. *Stahl und Eisen*, v. 78, no. 7, Apr. 3, 1958, p. 412-418.

Description of opacimeter. Effect of light intensity of searchlight on the curve pattern. Effect of converter age and temperature on opacimeter curve. The P content in the bath after having reached the maximum of the curve. The iron content in the slag.

11158 Some Aspects of the Recovery of Lithium From Spodumene. G. D. White and T. N. McVay. *U. S. Atomic Energy Commission, ORNL-2450*, Apr. 3, 1958, 17 pp. (UF767 U3o Contin.)

Occurrence and mineralogy of spodumene; determination of firing range; leached β-spodumene; spodumene-CaO reactions.

11159* (German.) Reduction of Titanium Tetrachloride With Molten Sodium-Zinc. **Die Reduktion von Titantetrachlorid mit Natrium-Zink-Schmelzen.** Walter Häusler. *Zeitschrift für Metallkunde*, v. 49, no. 4, Apr. 1958, p. 206-209.

In an analogy to the amalgamation process $TiCl_4$ was put into a molten Na-Zn mixture at 550-600 C. The reduced Ti dissolves in the Zn and can be isolated in high vacuum at 650 C. The Na content is very small.

11160* (Russian.) Study of the Equilibrium in the Deoxidation Reactions of ZrO_2 and V_2O_3 With Carbon at High Temperatures. **Issledovanie ravnovesiia v reaktsiiakh vosstanovleniia ZrO_2 i V_2O_3 uglerodom pri vysokikh temperaturakh.** V. I. Zhelankin, V. S. Kutsev, and B. F. Ormont. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 5, May 1958, p. 1237-1240.

See also: **10497** (slag and refractory analysis by infrared spectroscopy); **10996** (reclaiming Ag from old hypo).

METALS—FINISHING, POLISHING, AND CLEANING

11161 The Effects of Pressure in Mechanical Polishing. Cornelius A. Johnson. *AB Metal Digest*, v. 4, no. 3, May 1958, p. 2-10.

Describes the various stages necessary to produce a properly prepared microsection and particularly stresses the advantages of the Buehler technique of heavy pressure polishing.

11162* (German.) The Influence of Gas- and Salt Bath Nitration on the Properties of Structural Steels. **Der Einfluss des Gas- und Salzbadnitrierens auf die Eigenschaften von Konstruktionsstählen. II.** H. Wiegand and M. Koch. *Metalloberfläche*, v. 12, no. 4, Apr. 1958, p. 97-101.

Steels tested were C35, C60, 16MnCr5, 34Cr4, and CrA16.

11163 Finishing Die Castings. V. Chromate Conversion Treatments. Raymond Stricklen. *Precision Metal Molding*, v. 16, June 1958, p. 43-45.

METALS—FOUNDRY PRACTICE

11164* Mould Hardness: What It Means. R. W. Heine, E. H. King, and J. S. Schumacher. *Canadian Metalworking*, v. 21, Apr. 1958, p. 38 + 2 pages.

The basic relationship of mold hardness to green strength is generally applicable to clay-saturated sands. In clay-poor sands, it depends on clay content and factors influencing clay distribution.

11165* (Italian.) Designing Iron Castings. **La progettazione dei getti in ghisa.** Mario Bertacchini. *Fonderia*, v. 7, Apr. 1958, p. 155-165.

Principal rules concerning the design of satisfactory casting in connection with the construction, the soundness, and the price of a casting.

11166 Evaluation of Bentonites in the Steel Foundry. Victor E. Zang. *Foundry*, v. 86, May 1958, p. 154-157.

Properties of western bentonite can affect molding sand mixes. Effects and tests for measuring the characteristics of the material are described.

11167 Oxygen Injection Process Aids Cupola Combustion Control. John B. La Pota. *Foundry*, v. 86, May 1958, p. 269 + 4 pages.

Streams of pure O are injected directly into each tuyere at a velocity somewhat greater than the air blast for a localized concentration of pure O in the combustion area.

11168* (German.) The High Temperature Stability of Molding Sand and Its Relation to Flaws in Castings. **Die Warmfestigkeit von Formsand und ihre Beziehung zu Gussfehlern.** H. W. Dietert, V. M. Rowell, and A. L. Graham. *Giesserei*, v. 45, no. 7, Mar. 27, 1958, p. 157-166.

Causes of casting defects. Determination of sand properties. Erosion or expansion scabs caused by critical temperature, unaccomodated expansion, or blocked areas.

11169* (German.) Considerations on the Theory of Shell Molding. **Betrachtungen zur Theorie des Maskenformverfahrens.** A. Braybrook and B. H. C. Waters. *Giesserei*, v. 45, no. 10, May 8, 1958, p. 263-278.

The sand grades used; cold and hot strength of shell; coring of resins; hardness of shell; effect of clay; permeability of shell to gas; resin-coated sand; gas content of a shell; surface condition of casting; closing shell; gates and risers; structure; molding boards.

11170* (German.) The Problem of Using Metallic Cooling Agents in Steel Casting. **Zur Frage der Verwendung metallischer Kühlkörper im Stahlformguss.** Hermann Wesner and Wolfgang Probst. *Giessereitechnik*, v. 4, no. 2, Feb. 1958, p. 30-32.

Cast iron chills have limited use in casting steel, but may be used freely in gray iron foundries.

11171* (Russian.) Technology of Production of Cast Iron Molds for Critical Work Under High Pressure. **Tekhnologiia proizvodstva otvetstvennykh chugunnykh otlivok rabotaiushchikh pri vysokikh davleniiakh.** N. L. Sobol'. *Liteinoe Proizvodstvo* (Special Supplement), 1957, p. 18-24.

Discusses the defects, their characteristics, cause, and means of prevention.

11172* (Russian.) Irregularly Shaped Iron and Steel Chill Casting. **Proizvodstvo fasonnogo chugunnogo i stal'nogo lit'ia v kokil'.** A. I. Shapiro. *Liteinoe Proizvodstvo* (Special Supplement), 1957, p. 32-33.

Chemical composition and technological data for obtaining castings of high quality, with no surface cementite.

11173* A Little Knowledge of Plastics. Robert LeMaster. *Modern Castings*, v. 33, May 1958, p. 99-100.

Plastics role in the foundry.

11174* Magnesium Content and Graphite Forms in Cast Iron. James F. Ellis and C. K. Donoho. *Modern Castings*, v. 33, May 1958, p. 105-111.

The effect of increasing Mg content in three different base irons on tensile properties and graphite structures are determined. Transition structures in changing from flake graphite to spherulitic graphite are shown and discussed. Also the effect of excessive Mg content on graphite form is shown. An extension of the standard system of graphite classification is suggested.

11175* A Method of Casting Radiator-Type Fuel Elements for a Nuclear Reactor. A. W. Hare and R. F. Dickerson. *Modern Castings*, v. 33, May 1958, p. 112-114.

The casting of perforated-hexagon subsections which were 2 and 4-in. high and about 3.9-in. wide containing 397 perforations, 0.165-in. in diameter is described. Optimum casting conditions for the Cr-U eutectic alloy were found to be a pouring temperature of 2000 F with a graphite mold temperature of 1600 F. The fact that this shape could be cast makes possible the production of such a shape without the addition of excessive machining costs.

11176* Some Remarks on the Relationship of Interface Temperature and Solidification. V. Paschkis and J. W. Hlinka. *Modern Castings*, v. 33, May 1958, p. 115-123.

Relationships are derived and curves plotted for the variation of casting-mold interface temperature with time for iron freezing in sand or iron molds.

11177* Ductile High Strength Titanium Castings by Induction Melting. J. Zotos, P. J. Ahearn, and H. M. Green. *Modern Castings*, v. 33, May 1958, p. 127-132.

Titanium alloy scrap was remelted by a modified induction melting technique and then processed into castings. Metallurgical evaluation of the castings included chemical analysis, macro and microstructure, and mechanical properties. These tests indicate that scrap Ti can be reprocessed by induction melting and still exhibit desirable engineering characteristics that make it a useful foundry alloy.

11178 Investment Casting in Europe. H. J. Marshall. *Precision Metal Molding*, v. 16, June 1958, p. 24-26.

11179 Designing for Aluminum Permanent Mold Casting. III. Tolerances. *Precision Metal Molding*, v. 16, June 1958, p. 28 + 2 pages.

11180 A Vacuum System for Die Casting Aluminum. G. R. Morton. *Precision Metal Molding*, v. 16, June 1958, p. 30 + 1 page.

High rejects due to high humidity led to development of a vacuum die casting system.

11181 (French.) Production and Use of Large Aluminum Pressure Castings. **Fabrication et emploi de grandes pièces moulées sous pression en aluminium.** A. F. Bauer. *Revue de l'Aluminium*, v. 35, no. 252, Mar. 1958, p. 281-291.

Detailed study of the manufacture of large molds, design of parts, processes for testing the metal, and casting conditions required for high quality parts.

See also: **11126** (fretting corrosion of cast iron); **11214** (properties of cast iron); **11226** (resistance of steel castings to high stress abrasion).

METALS—HEAT TREATMENT

11182 On-the-Spot Stress Relief. W. C. O'Brien. *American Machinist*, v. 102, May 19, 1958, p. 141.

A 114-ft. welded tank is stress relieved *in situ*.

11183 A Contribution to the Hardenability Problem in Titanium Alloys. R. P. Elliott and W. Rostoker. *American Society for Metals, Transactions*, v. 51; *Preprint No.* 76, 1957, 22 pp. (TS300 Am35t Vis.)

Analysis of cooling curves of unalloyed Ti and two alloys containing 5 and 20% V respectively, demonstrates that thermal diffusivity cannot be considered constant for all alloys. Two methods are described which permit the determination of thermal diffusivity and quench severity from quenching experiments.

11184* (Russian.) Automatic Current Regulator for a Cooper Wire Annealing Plant. **Avtomaticheskii reguliator toka v ustanovke dlia otzhiga mednoi provoloki na volochil'nom stanke.** N. V. Petina. *Avtomatika*, 1957, no. 4, p. 18-20.

11185* (French.) Graphitization in Salt Baths, Its Application to Castings With High Sulfur Content. **La graphitisation en bains de sels; son application aux fontes à haute teneur en soufre.** Olivier Bader and Daniel Godot. *Fonderie Belge*, v. 28, Apr. 1958, p. 123-125.

With castings containing unstable cementite a liquid bath was used, allowing a rapid increase of temperature and a one hour graphitization. Advantages of the material and salts used.

11186* Magnetic Test Accurately Compares Heat Extraction Properties of Quenching Media. Edward A. Bender and Harry J. Gilliland. *General Motors Engineering Journal*, v. 5, no. 2, Apr.-May-June 1958, p. 31-33.

Quenching speed is measured by time required to cool a metal to its Curie point.

11187 Automation in Heating and Quenching. I. Norbert K. Koebel. *Industrial Heating*, v. 25, Apr. 1958, p. 682 + 8 pages.

Equipment and methods for automated heat treating of small and medium size parts. (To be continued.)

11188 High-Temperature Carburizing Takes Half the Time. P. M. Unterweiser. *Iron Age*, v. 181, no. 21, May 22, 1958, p. 123-125.

Behavior of 4620, 8620, and 9310 steels up to 1900 F.

11189 Aging of Pure Iron After Heat Treatment. P. G. Morgan. *Iron & Steel*, v. 31, no. 6, May 1958, p. 299-300.

Describes the effect of heat treatment on the mechanical properties, and also the study of the precipitation of carbon from the solid supersaturation solution by measurement of the electrical resistance at very low temperatures.

11190 Fast Annealing of Sheet-Strip Coils With Helium Injection. J. D. Keller. *Iron and Steel Engineer*, v. 35, Apr. 1958, p. 109-115.

Use of He in stack annealing can radically reduce annealing times. The He is injected into the narrow spaces between the convolutions of the coils.

11191 The Effect of Tantalum and Niobium on the Tempering of Certain Vanadium and Molybdenum Steels. Arun K. Seal and R. W. K. Honeycombe. *Iron and Steel Institute, Journal*, v. 188, pt. 4, Apr. 1958, p. 343-350 + 4 plates.

Study of the carbides formed during the tempering of several steels in which the onset of secondary hardening can be directly related to the precipitation of V_4C_3 and Mo_2C by use of electron microscopic and electron diffraction methods.

11192* (Russian.) Magnetometric Study of the Electrotempering of Steel. **Magnitometricheskoe issledovanie elektrootpuska stali.** B. N. Gridnev, V. G. Permiakov, and V. T. Cherepin. *Metallovedenie i Obrabotka Metallov*, 1958, no. 4, Apr., p. 9-16.

11193 Liquefied Petroleum Gases for Controlled Atmosphere Production. L. G. W. Palethorpe. *Metallurgia*, v. 57, May 1958, p. 219-223.

Controlled atmospheres for heat treatment furnaces for such operations as clean hardening, carburizing, carbonitriding, and bright annealing.

11194* (Italian.) Plan and Calculation of Special Furnace for Austenitization of Stainless Steel Sheets. **Progetto e calcolazione di un forno speciale per austenitizzazione di lamiere inossidabili.** I. Montevecchi. *Metallurgia Italiana*, v. 50, no. 2, Feb. 1958, p. 53-58.

A differential method of calculation was used to plan an electric furnace.

11195 Metallurgy of Tempering and Annealing in Fractional Minutes. R. K. Wuerfel. *Metal Progress*, v. 73, no. 4, Apr. 1958, p. 93-96.

Conditions for annealing non-ferrous metals and tempering steels can be put on master curves. Tests show that the optimum time for annealing or tempering by fractional-minute induction heating can be calculated.

11196 Salt Baths and Salt Bath Furnaces. Haig Solakian. *Metal Treating*, v. 9, no. 2, Mar.-Apr. 1958, p. 8 + 5 pages.

Equipment and procedures for the 1200-1800 F and 1850-2350 F ranges.

11197 Hydrogen Embrittlement Put on the Spot. A. R. Booker. *Metal Treating*, v. 9, no. 2, Mar.-Apr. 1958, p. 10-11.

Embrittlement relief procedures.

11198* (Polish.) The Effect of the Quality and Temperature of a Fliud Medium on the Annealing and Properties of Black Malleable Cast Iron. **Wpływ rodzaju i temperatury ośrodka ciekłego na wyzarzanie i własności czarnego zeliwa ciagliwego.** Jan Rączka. *Prace Instytutu Odlewnictwa*, v. 7, no. 2, 1957, p. 140-155.

Effect of the type and temperature of fluid medium on the rate of the first and second graphitization periods. Annealing was carried out in salt baths consisting respectively of: NaCl, $BaCl_2$+NaCl, NaCl+KCl, and BaCl, melted window glass, and electric furnaces.

11199* (French.) Flame Hardening and Local Heat Treatment. **Trempe à la flamme et traitement thermique local.** H. W. Grönegress. *Revue de Métallurgie*, v. 55, no. 3, Mar. 1958, p. 211-217.

Predicting the surface hardness and depth of hardening given by flame hardening of C and low-alloy steels. Replacing the specified long-time heating tests by rapid tests using rotating burners. Surface hardness in high-alloy steels.

11200* (German.) The Effect of Surface Foreign Layers on the Structural Modifications of Thin Vapor Deposited Metal Coatings During Tempering. **Der Einfluss von Oberflächenfremdschichten auf die Strukturveränderungen dünner Metallaufdampfschichten beim Tempern.** Karl-Joseph Hanszen. *Zeitschrift für Physik*, v. 150, no. 5, 1958, p. 527-550.

Effects of mechanical protective coatings. Increase of the mobility of the metal atoms on the protected metal surfaces. Increase of the vaporizing rate of the metal by surface linkage between the foreign layer and the metal.

See also: **11282** (aging characteristic of Hastelloy B) **11295** (hardenability of alloy steel); **11566** (gas generators for protective atmosphere).

METALS—MECHANICAL AND PHYSICAL PROPERTIES

11201 (English.) **Thermodynamic Analysis of Binary Liquid Alloys of Group IIB Metals. I. The Systems Zinc-Cadmium, Zinc-Gallium, Zinc-Indium and Zinc-Tin. II. The Alloys of Cadmium With Gallium, Indium, Tin, Thallium, Lead and Bismuth.** O. J. Kleppa. *Acta Metallurgica*, v. 6, Apr. 1958, p. 225-242.

Data on heat of mixing and excess entropy.

11202 (English.) **The Plastic Behaviour of Copper Crystals Containing Zinc in the Surface Layer.** M. A. Adams. *Acta Metallurgica*, v. 6, May 1958, p. 327-338.

Tensile tests have been made on Cu crystals containing various concentrations of Zn in the surface layer. Crystals containing small amounts of Zn, after a small pre-strain and an anneal at 200 C, showed a yield point; in crystals of higher surface Zn content the yield point was absent. Previous deformation affected the yielding behavior of both lightly and heavily zincified specimens.

11203 (English.) **An Investigation of the Rate Controlling Mechanism for Plastic Flow of Copper at 90° and 170°K.** H. Conrad. *Acta Metallurgica*, v. 6, May 1958, p. 339-350.

The plastic flow characteristics of Cu single crystals were investigated by means of incremental loading creep tests and change-in-strain-rate tension tests for the purpose of determining whether the intersection of dislocations is the rate controlling process in low temperature deformation. The present results indicate that although the nature of the stress function is similar to that predicted by the intersecting mechanism, the constant B is relatively independent of temperature rather than proportional to the reciprocal of the temperature as required by the theory.

11204 (English.) **Adiabatic Young's Modulus and Internal Friction of Superconducting Lead and Tin.** B. Welber and S. L. Quimby. *Acta Metallurgica*, v. 6, May 1958, p. 351-359.

Variations of these quantities with temperature and strain amplitude. An upper limit is assigned to the existence of a discontinuity in the Young's modulus at the critical temperature. The results are discussed from the viewpoint of the thermodynamics of the superconducting transition.

11205* (Russian.) On the Electroconductivity of Two-Component Metal Powder Alloys. **K voprosu ob elektroprovodnosti dvukhkomponentnykh metallokeramicheskikh splavov.** A. I. Raichenko and I. M. Fedorchenko. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1958, no. 3, p. 255-257.

Method of calculation is applicable to alloys of any average concentration in any intermediate state.

11206 Effect of Fretting on Fatigue Characteristics of Titanium-Steel and Steel-Steel Joints. W. L. Starkey, S. M. Marco, and J. A. Collins. *American Society of Mechanical Engineers, Paper No.* 57-A—113, 1957, 10 pp. (TJ1 Am35p Vis.)

11207 Temperature Stresses in the Two-Phase Alloy, WC-Co. J. Gurland. *American Society for Metals, Transactions*, v. 50; *Preprint No.* 3, 1957, 12 pp. + 4 plates. (TS300 Am35t Vis.)

Thermally induced stresses in the WC constituent of sintered WC-Co alloys were calculated from elastic theory and were measured by X-ray diffraction techniques. The compositions of the alloys ranged from 5 to 37 vol. % Co. It was found that compressive stresses act on the dispersed carbide phase of high binder compositions, but that tensile stress components become predominant in low binder alloys.

11208 Calculated and Observed Effects of Texture on the Magnetic Properties and Young's Modulus of Nickel Sheet. E. R. W. Jones, C. A. Clark, and E. A. Fell. *British Journal of Applied Physics*, v. 9, May 1958, p. 178-184.

Relative values of Young's modulus, magnetostrictive coupling coefficient and initial and maximum permeabilities are calculated for various textures in Ni; an approximate model being used for magnetic properties. Experimental values are given for high purity polycrystalline Ni sheet produced by powder metallurgy and annealed in purified H. Comparison between theory and experiment indicates good agreement for Young's modulus and fair agreement for magnetic properties.

11209 The High Temperature Stability of Permanent Magnets of the Iron-Nickel-Aluminium System. A. G. Clegg and M. McCaig. *British Journal of Applied Physics*, v. 9, May 1958, p. 194-199.

The open circuit magnetization of rectangular bars of various modern permanent magnet alloys were measured up to 550 C. To avoid the irreversible losses, stabilization at a higher temperature is better than aging in an alternating field.

11210 The Freezing Points of High Purity Metals as Precision Temperature Standards. III. Thermal Analyses on Eight Grades of Zinc With Purities Greater Than 99.99 + %. E. H. McLaren. *Canadian Journal of Physics*, v. 36, May 1958, p. 585-598.

Eight grades of high purity zinc are examined. A reported discrepancy of about 0.1 C in the freezing points of zinc between the Russian and Canadian laboratories is not due to different impurity contents of the zincs that were used.

11211* (English.) **The Deformation Texture of β-Sn. III. Derivation of Texture From Elements of Plastic Deformation.** Karel Toman and Marie Simerská. *Czechoslovak Journal of Physics*, v. 8, no. 2, 1958, p. 233-245.

The textures derived theoretically were compared with the compression and rolling textures measured in β-tin.

11212* (Russian.) Thermal Aging of Highly-Coercive Alloys. **O temperaturnom starenii vysokokoertsitivnykh splavov.** R. S. Borovskoia, A. M. Morozova, and F. I. Feigina. *Elektrichestvo*, 1958, no. 3, Mar., p. 66-69.

Investigation of Alnico, Alni and Magnico alloys in respect to the effect of temperature changes on their properties.

11213 Fatigue of Aircraft Structures. 100 pp. 1957. American Society for Testing Materials, Philadelphia. (TL671 Am35f)

Full scale wing fatigue testing; riveted-joints fatigue strength; rehabilitation of fatigue-weary structure; uni-directional axial tension fatigue tests of beryllium copper and several precipitation hardening corrosion-resistant steels; effect of forming on mechanical properties; fatigue testing of airframe structural components.

11214* (German.) The Velocity of Sound as a Characteristic Value for Assessing the Properties of Cast Iron. **Die Schallgeschwindigkeit als kennzeichnende Grösse für die Beurteilung von Gusseisen.** Rolf Ziegler and Richard Gerstner. *Giesserei*, v. 45, no. 8, Apr. 10, 1958, p. 185-193.

The velocity of sound and its dependency on the modulus of elasticity. The modulus of elasticity and its relations with the properties of cast iron. Determination of the velocity of sound, modulus of elasticity, amount and size of lamellar graphite, saturation degree and tensile strength. Effect of accelerated cooling.

11215 The Structure and Mechanical Properties of High-Purity Aluminium-Zinc-Magnesium Alloys. P. C. Varley, M. K. B. Day, and A. Sendorek. *Institute of Metals, Journal*, v. 86, pt. 8, Apr. 1958, p. 337-351.

When above alloys were quenched from 465 C and naturally aged, they showed a steady improvement in mechanical properties with a decrease in ductility as the alloying content and the time of aging were raised, the fractures becoming increasingly intercrystalline and brittle. With a standard artificial aging treatment of 16 hr. at 135 C, there was again a steady rise in tensile strength and proof stress with increasing alloying additions, and a maximum was reached with 9% addition. Above this, the alloys were brittle and the proof stress could not be determined. Electron micrographs showed that this intercrystalline weakness was associated with the development of mechanically weak, denuded zones along the grain boundaries, as a result of preferential grain-boundary precipitation.

11216 A New Investigation of Anomalies in Chromium. H. Pursey. *Institute of Metals, Journal*, v. 86, pt. 8, Apr. 1958, p. 362-368.

N. P. L. measurements on pure Cr; effects of metallic impurities; reduction in Poisson's ratio; and anomaly in Mn-Cu alloy are discussed in an attempt to account for the anomalies in Cr.

11217* **Measurement of Residual Stresses in Alloy Steel Forgings.** A. Barker and E. H. Hardy. *Institution of Mechanical Engineers, Proceedings*, v. 171, no. 17, 1957, p. 581-596.

The trepanning method is limited in application but can give longitudinal bore stresses to an accuracy better than ±1 ton per sq. in. in some cases and often without destroying the forgings. The Sachs method is satisfactory provided adequate precautions are taken.

11218 The Effect of Phosphorus on the Tensile and Notch-Impact Properties of High-Purity Iron and Iron-Carbon Alloys. B. E. Hopkins and H. R. Tipler. *Iron & Steel*, v. 31, no. 6, May 1958, p. 263-274.

Two important effects of adding phosphorus to iron are the much greater strengthening effect than obtained by comparable amounts of metallic alloying elements, and the progressive development of grain-boundary weakness which can be modified by heat treatment.

11219 The Use of Paraffin Wax as a Model Material to Simulate the Plastic Deformation of Metals. II. Practical Applications of This Technique. J. W. Barton, C. Bodsworth, and J. Halling. *Iron and Steel Institute, Journal*, v. 188, pt. 4, Apr. 1958, p. 321-331.

Application to study of metal flow during extrusion and rolling.

11220 Thermal Expansion of Some Transition Metal Carbides. Reed O. Elliott and Charles P. Kempter. *Journal of Physical Chemistry*, v. 62, May 1958, p. 630-631.

Linear thermal expansion coefficients were determined over the temperature range 20-900 C by X-ray diffraction on powders having the formulas $TiC_{0.92_1}$, $ZrC_{0.957}$, $NbC_{0.984}$, and $TaC_{0.984}$. The average lattice constants were: TiC = 4.3336, ZrC = 4.7000, NbC = 4,4850, and TaC = 4.4695 A. The average coefficients of expansion were: TiC =7.32, ZrC = 6.88, NbC = 6.74, and TaC = 6.49 x 10^{-}/°C. In this temperature range the thermal expansion of these four materials decreases in proportion to increasing mol. wt.

11221* (Russian.) The Study of Mechanical and Magnetic Properties of the Fe-Ni-Al Alloys for Permanent Magnets. **Issledovanie mekhanicheskikh i magnitnykh svoistv Fe-Ni-Al-splavov dlia postoiannykh magnitov.** A. A. Shekalov and Ia. I. Shtreis. *Metallovedenie i Obrabotka Metallov*, 1958, no. 4, Apr., p. 29-38.

11222 "Size" Effects and Their Possible Significance for "Non-Propagating" Cracks in Metal Fatigue. W. J. Harris. *Metallurgia*, v. 57, Apr. 1958, p. 193-197.

The fundamental role played by "size" or "scale" phenomena throughout the laws of nature can, it is suggested, in the case of the static and fatigue strength of metals and the existence of "nonpropagating" fatigue cracks, be attributed to the existence of characteristic "flaw patterns".

11223* (French.) The Strength of High Pressure Vessels. **La résistance des réservoirs pour hautes pressions.** R. Epain. *Métallurgie et la Construction Mécanique*, v. 90, Apr. 1958, p. 263 + 5 pages.

Study of self hooping cylinders, stresses and strains during hooping, limit hooping pressure, and bursting of thick cylinders.

11224 Tear Test for Titanium Sheet. C. W. Vigor and J. R. Hornaday, Jr. *Metal Progress*, v. 73, no. 4, Apr. 1958, p. 103-106.

Small coupons are torn by a conventional tensile testing machine. The amount and duration of applied force are recorded and used to determine the work required for tearing. Resulting data measure effect of H embrittlement and thermal instability.

11225 Metals. 175 pp. 1957. American Society for Testing Materials, Philadelphia. (TA459 Am35me)

Studies of type 301 stainless steel columns; shotpeening effects and specifications; axial stress fatigue, creep, and rupture properties of unnotched and notched specimens of heat resistant alloys; effect of forming on mechanical properties; determination of Young's modulus under conditions of relaxation; effect of a number of variables on the fatigue properties of high strength steels; effect of temperature, frequency, and grain size on the fatigue properties of high purity aluminum; determination of fatigue-crack initiation and propagation in a magnesium alloy; uni-directional axial tension fatigue tests of beryllium copper and several precipitation hardening corrosion resistant steels; the properties of beryllium copper strip as affected by cold rolling and heat treatment; pit depth measurements as a means of evaluating the corrosion resistance of aluminum in sea water.

11226* Factors Influencing the Resistance of Steel Castings to High Stress Abrasion. T. E. Norman. *Modern Castings*, v. 33, May 1958, p. 89-98.

A method of evaluating the abrasion resistance of materials for heavy-section steel castings, by running these materials as large-sized marked balls in a ball mill is described. By this means it is possible to evaluate the relative merits of grinding mill liner materials within a short time. The results from this short-time test correlate well with the results from actual sets of liners having similar composition and structure.

11227 The Thermal and Electrical Resistivity of Bismuth and Antimony at Low Temperatures. G. K. White and S. B. Woods. *Philosophical Magazine*, v. 3, no. 28, Apr. 1958, p. 342-359.

11228 Plastic Deformation of Nickel Single Crystals at Low Temperatures. Peter Haasen. *Philosophical Magazine*, v. 3, no. 28, Apr. 1958, p. 384-418.

Crystals were deformed in tension at various temperatures between 4.2 and 300 K. Shear stress-shear strain relations were determined as well as the reversible change of flow stress with temperature.

11229 The Thermal Conductivity of Tin-Indium Alloys in the Normal State. C. A. Shiffman. *Physical Society, Proceedings*, v. 71, Apr. 1958, p. 597-607.

11230 Preparation and Some Physical Properties of Bi_2Te_3, Sb_2Te_3, and As_2Te_3. T. C. Harman, B. Paris, S. E. Miller, and H. L. Goering. *Physics and Chemistry of Solids*, v. 2, no. 3, 1957, p. 181-190.

Preparation of the above intermetallic compounds from purified elements by several techniques is discussed. Advantages and disadvantages of the techniques are enumerated. Electrical and thermal properties are presented as functions of temperature and impurity concentration. The variation of carrier mobility with temperature is approximately $T^{-5/2}$ for As_2Te_3 and Bi_2Te_3. An anomalous variation of Hall coefficient with temperature is observed. The thermal conductivities of the three compounds are similar.

11231 The Effect of Elastic Strain on the Superconducting Transition of Tin, and the Effects of Pressure on the Transitions of Thallium, Mercury, and Tantalum. Milan D. Fiske. *Physics and Chemistry of Solids*, v. 2, no. 3, 1957, p. 191-198.

11232 The Magnetic Properties of Superconducting Alloys. A. A. Abrikosov. *Physics and Chemistry of Solids*, v. 2, no. 3, 1957, p. 199-208.

A new explanation is proposed for the magnetic properties of superconducting alloys based on the theory of Ginzburg and Landau. The structure of the penetrating field is found for a superconductor and the relationship between induction and field strength. The findings are compared with experimental results.

11233 Resistivity Due to Dislocations in Copper. Walter A. Harrison. *Physics and Chemistry of Solids*, v. 5, nos. 1/2, 1958, p. 44-46.

11234* (Polish.) Temper Brittleness of 3OHGSA Steel With and Without Addition of Vanadium. **Kruchość odpuszczania stali 3OHGSA z dodatkiem i bez dodatku wanadu.** S. Orzechowski and C. Gawin. *Prace Instytutów Hutniczych*, 1958, no. 1, p. 1-16.

Addition of V up to 0.2% to Cr-Si-Mn steel reduces impact properites if the tempering temperature is between 500 and 575 C. The harmful effect is due to increase of temper brittleness.

11235* (Polish.) Non-Magnetic Copper Alloys. **Niemagnetyczne Stopy miedzi.** G. Zaborowski and L. Siarzewski. *Prace Instytutów Hutniczych*, 1958, no. 1, p. 41-51.

Magnetic properties of three Cu alloys after cold working reduction of 10, 25, 35, and 50%. Manufacture of non-magnetic sheets.

11236* (Polish.) Compensating Method of Measurement of Electric Resistivity in Sintered Materials. **Metoda kompensacyjna pomiaru oporności elektrycznej materialów spiekanych.** E. Waniewski. *Prace Instytutów Hutniczych*, 1958, no. 1, p. 63-69.

Measurement as affected by length of test piece. Mean resistivity. Diffusion between two different powder materials, first compressed and then sintered.

11237* (French.) Relationships Between Hot and Subzero Brittleness in 18-8 Austenitic Steels. **Relations entre les fragilités à chaud et à froid dans les aciers austénitiques du type 18-8.** André Gueussier and René Castro. *Revue de Métallurgie*, v. 55, no. 2, Feb. 1958, p. 107-122.

Carbide precipitations in austenitic steels by sensitization embrittle at very low temperatures. Character of precipitations when steel contains Ti and Nb. Embrittlement at high temperatures. Precipitations during deformation; effect of previous treatment.

11238* (French.) A Statistical Representation of Fatigue Test Results. **Une présentation statistique dez résultats d'essais de fatigue.** J. Strebelle. *Revue de la Soudure*, v. 14, no. 1, 1958, p. 24-32.

Test pieces were subjected to stresses near, or slightly above, the fatigue limit. Graphic representation of results on a Wöhler diagram.

11239* (German.) Determination of the Susceptibility to Aging of Steel by Hardness Test. **Ermittlung der Alterungsanfälligkeit von Stahl durch Härteprüfung.** Karl Mrosko. *Schweisstechnik* (Berlin), v. 8, Apr. 1958, p. 127-130.

Hardness was measured at room temperature and at 200 C.

11240 Thermal Properties of Thirteen Metals. C. F. Lucks and H. W. Deem. 29 pp. 1958. American Society for Testing Materials, Philadelphia. (TA459 L96.4t)

Thermal-conductivity, linear-thermal-expansion, specific-heat, density, and thermal-diffusivity values are reported over the temperature ranges shown for the following metals: 2024-T4 and 7075-T6 Al from −250 to 800 F, Cr from 75 to 3000 F (thermal conductivity and diffusivity 400 to 1800 F), Cu from 75 to 1900 F (density from 75 to 3000 F), Inconel and Inconel "X" from −250 to 1800 F, AN-M-29 Mg from −250 to 600 F, Mo from 75 to 3000 F (thermal conductivity and diffusivity from 400 to 1600 F), "K" monel from −250 to 1800 F, SAE 1010 steel from −250 to 1650 F, stainless steels types 301, 316, and 347 from −250 to 1800 F.

11241* (Russian.) Plastic Properties and Microstructure of Arc Melted Commercial Grade Titanium. **Plasticheskie svoistva i mikrostruktura tekhnicheskogo titana dugovoi plavki.** V. V. Zholobov and A. D. Landikhov. *Tsvetnye Metally*, v. 31, no. 3, Mar. 1958, p. 66-69.

Tensile strength and yield point decrease with rising temperature and are very low above 700 C. Plasticity sharply increases above 700 C. Decrease of plasticity between 400 and 500 C is observed. From room temperature to 400 C, plasticity depends on metal purity. The micro-structure of commercial Ti in forged and hardened state depends on testing temperature and purity of alloy.

11242 Thermal Expansion of Rare Earth Metals. Fred Barson, S. Legvold, and F. H. Spedding. *U. S. Atomic Energy Commission, ISC-831*, June 1956, 71 pp. (UF767 Un3.1is Contin.)

11243 Test of 61S-T6 Aluminum Sheet Under Short-Duration, High Rate of Rise, Heating. J. A. Barber. *U. S. Atomic Energy Commission, SCTM3-58(16)*, Jan. 20, 1958, 16 pp. (UF767 Un3.1sct Contin.)

Elongation and ultimate strength were determined in both welded and unwelded specimens in the 400 to 900 F temperature range. The rate of temperature rise was between 150 and 200 F per sec.

11244 Influence of Alloying Upon Grain-Boundary Creep. F. N. Rhines, W. E. Bond, and M. A. Kissel. *U. S. National Advisory Committee for Aeronautics, Report* 1331, 1957, 6 pp. (TL521 Un3r Vis.)

Grain-boundary displacement, occurring in bicrystals during creep at elevated temperature (350 C), was measured as a function of the Cu content (0.1 to 3%) in a series of Al-rich Al-Cu solid-solution alloys.

11245 Stress-Life Relation of the Rolling-Contact Fatigue Spin Rig. Robert H. Butler and Thomas L. Carter. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3930, Mar. 1957, 23 pp. (TL570 Un3t Vis.)

Rig was used to test groups of SAE 52100 9/16-in. diameter balls lubricated with a mineral oil at 600,000-, 675,000-, and 750,000-psi maximum Hertz stress.

11246* Elevated Temperature Relaxation Properties of 17-7 PH Stainless Steel Helical Compression Springs. Mason Clogg, Jr. *Wire and Wire Products*, v. 33, Apr. 1958, p. 401-405.

Variations in temperature, time, and stress were considered.

11247* (Russian.) Measurement of the Magnetic Susceptibility of Liquid Metals. **Izmerenie magnitnoi vospriimchivosti zhidkikh metallov.** A. A. Vertman and A. M. Samarin. *Zavodskaia Laboratoriia*, v. 24, no. 3, 1958, p. 309-310.

Systems of Fe-Ni, Ni-Co, and Fe-Si were tested as to their magnetic susceptibility in liquid state at 1700 C.

11248* (Russian.) Relationship Between Micro- and Macro-Hardness of Metals. **O sviazi mezhdu makro- i mikrotverdost' iu metallov.** V. D. Lisitsyn. *Zavodskaia Laboratoriia*, v. 24, no. 4, 1958, p. 467-470.

11249* (German.) Electrical Conductivity and the Hall Coefficient. **Leitfähigkeit und Hallkonstante. IX.** A Method for the Separate Determination of Density and Mobility of the Charge Carriers of Different Sign in Metals. **Eine Methode zur getrennten Bestimmung der Dichte und Beweglichkeit von Ladungsträgern verschiedenen Vorzeichens in Metallen.** Hans-Eberhard Schmidt. *Zeitschrift für Metallkunde*, v. 49, no. 3, Mar. 1958, p. 113-123.

Measurements of electrical conductivity; Hall coefficient, absolute thermoelectric power, and Ettinghausen-Nernst coefficient in Ag-Pd, Cu-Ni, Cu-Au, and Ni-Cr alloys.

11250* (German.) Investigation of the Electric Conductivity of Gold-Manganese Alloys. **Untersuchung der elektrischen Leitfähigkeit von Gold-Mangan-Legierungen.** Heinz Eicke. *Zeitschrift für Metallkunde*, v. 49, no. 3, Mar. 1958, p. 157-161.

The temperature dependence of the electrical resistivity of Au-Mn alloys in the quenched and annealed state was measured between −200 and 800 C.

11251* (German.) The Magnetic Properties of Rare Earth Metals at Very Low Temperatures. **Die magnetischen Eigenschaften von seltenen Erdmetallen bei sehr tiefen Temperaturen.** Hugo Leipfinger. *Zeitschrift für Physik*, v. 150, no. 4, 1958, p. 415-435.

Magnetic properties of Ce, Pr, Nd, Sm, Tb, Dy, Ho, Tm, and Yb were tested down to 1.5 K.

11252* (Russian.) Optical Properties of Metals in the Infrared Region. **Ob opticheskikh svoistvakh metallov v infrakrasnoi oblasti.** V. P. Silin. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 34, no. 3, Mar. 1958, p. 707-713.

Landau's theory of the Fermi-liquid is employed to describe the optical properties. Results obtained in this way differ significantly from those of the conventional electron theory of metals.

See also: **10642** (Cr vapor pressure over Cr-Fe alloys); **10824** (permeability in powder core materials); **10848** (galvanomagnetic effect of *n*-type Ge); **10889** (transverse magneto resistance in InSb); **10892** (physical properties of InSb); **10908** (reflection of slow electrons by metals); **11020** (properties of high temperature alloys); **11066** (mechanical wear of metals); **11086** (properties of spring steels); **11110** (low Cu, Mn brasses); **11117** (mechanical properties of Zr and Zircaloy-2); **11189** (effects of heat treatment on mechanical properties); **11198** (properties of black malleable cast iron); **11274** (calculation of free energy of formation of binary alloys); **11277** (temper brittleness of steel); **11282** (tensile properties of Hastelloy B); **11287** (deformation texture of β-tin); **11290** (slip in Cu); **11297** (deformation texture of Mo); **11438** (elastic moduli of Ge under pressure).

METALS—MECHANICAL WORKING

11253* (German.) Influence of the Extrusion Effect on the Strain Hardening of a Heat Treatable Aluminum-Copper Magnesium Alloy. **Über den Einfluss des Presseffektes auf die Verformungsverfestigung einer aushartbaren Aluminium-Kupfer-Magnesium-Legierung.** H. Richter and G. Wassermann. *Aluminium (Dusseldorf)*, v. 34, no. 4, Apr. 1958, p. 193-199.

Strain hardening produced by extrusion. Brittleness of extruded specimens during natural aging related to extrusion texture and recrystallization.

11254* (German and French.) Testing With Short Chip Aluminum-Free-Cutting Alloys. **Erfahrungen mit kurzspanigen Aluminium-Decolletage-Legierungen. Essais de décolletage sur des alliages d'aluminium domnant des copeaux courts.** H. Greutert. *Aluminium Suisse*, v. 8, no. 2, Mar. 1958, p. 41-47.

Properties of special Al alloys used in free-cutting. Cutting angle and cutting requirements in relation to tools. Shape of chip. Corrosion resistance. Applications.

11255 Contour-Finishing Missile Noses to 2 Micro-Inches. Rupert Le Grand. *American Machinist*, v. 102, May 5, 1958, p. 101-103.

Description of tracer-controlled grinding equipment.

11256 Bending Tools for Rod and Tubing. I-III. Allan Young. *American Machinist*, v. 102, May 19, 1958, p. 131 + 2 pages.

Cylindrical parts made of rod and tubing are among the most difficult to form in dies. Springback is harder to control, galling occurs more easily, and distortion is difficult to prevent. Here are some successful methods of bending round parts. Dies for bending tubing by the wrap-around method, such as that employed in a hand bender are illustrated. The relationship between groove depth to die block and pressure pad is shown; two types of split form block for making U-type bends in round parts are illustrated. Also illustrated is a split block arrangement in which the front block is also split from front to back.

11257* Soviet Ceramics. N. H. Cook. *Automatic Machining*, v. 19, no. 8, June 1958, p. 41-43.

Russian development and use of ceramic cutting tools has, until recently, been ahead of the U.S., and indeed may still be ahead, at least in the machining of steel. Russia now has a wide variety of ceramic tool bits, and is using them on production jobs. "Thermo-korund" and "Microlit" are two Russian brands. They have high hardness, persistent cutting ability at temperatures up to 1200 C (2200 F) and have the low tensile strength characteristic of our own brands.

11258* High Speed Machining—A New Concept. William E. Montgomery. *Carbide Engineering*, v. 10, May 1958, p. 9-11.

Use of new carbide material allows cutting speeds to be increased to 1000 SFPM or more. This material is basically a Ti carbide using Ni as a binder and containing Mo carbide as an alloy carbide addition. Optimum cutting speeds for this grade approach those for the best ceramic tool materials, but its superior strength allows it to take severe cuts usually resulting in greater weight of metal removed per unit of time.

11259* Ceramic Tooling—One Year Later. James B. Pond. *Carbide Engineering*, v. 10, May 1958, p. 12 + 4 pages.

Significant improvements in crystal size, density and manufacturing techniques have produced a better ceramic tool material than that of a year ago. Ceramic cutting tools have proved practical in production, with some installations operating for a year or more. Most new applications are on everyday materials such as low alloy steels, cast iron, brass, Al, graphite, and plastics.

11260 The Calculation of Drawing Force and Die Pressure in Wire Drawing. P. W. Whitton. *Institute of Metals, Journal*, v. 86, pt. 9, May 1958, p. 417-421.

Various wire-drawing theories are examined in the light of new knowledge, recently advanced, of the values for the coefficient of friction between the drawn wire and the die. A new expression, empirically based, is presented, which permits rapid and simple calculation of the drawing forces over the whole range. It is checked by the observations of three independent investigations and is accurate to within ±10% for wire both annealed and prestrained.

11261* Ultrasonic Machining. C. F. Brockelsby. *Institution of Electrical Engineers, Journal*, v. 4, no. 40, Apr. 1958, p. 168-172.

Ultrasonic machining is effected by what is essentially a high-speed reciprocating drill, driven from a magnetostrictive transducer, and working with an abrasive. It has useful application to the machining of sintered carbides and ceramics, and it is noteworthy that, although there is room for craftsmanship, unusual skill in operating the machines is not required, and little heating of the workpiece occurs.

11262 How to Get More for Your Metalworking Dollar: Machining Nonferrous Metals. *Iron Age*, v. 181, no. 17, Apr. 24, 1958, p. 113-128.

Machining practice with Al, Mg, Cu, and Ti and their alloys.

11263 Electromagnetic Test Measures Effects of Shot Peening. P. M. Unterweiser. *Iron Age*, v. 181, no. 23, June 5, 1958, p. 121-123.

Describes Russian test for determining effective depth of layer of compressed metal.

11264 New Drawing Process Eliminates Heat Treating for Strong Parts. E. S. Nachtman and E. B. Moore. *Journal of Metals*, v. 10, Apr. 1958, p. 281-284.

Parts formerly made from heat-treated alloy steels are now produced from carbon steel processed by elevated temperature drawing. Productivity and tool life are increased, while necessary strength properties are maintained.

11265* (Hungarian.) Determining the Output Requirement of Roller Sheet-Straightening Machines. **A görgös lemezegyengetőgépek teljusítményszükségletének meghatározása.** Sándor Geleji and György Dévényi. *Kohászati Lapok*, v. 13, nos. 2-3, Feb.-Mar. 1958, p. 111-117.

Input during cold sheet straightening. Deformation. Measurements on different straightening mills.

11266 Concentrated Wear of Turning Tools. V. Solaja and D. R. Cliffe. *Metal Treatment and Drop Forging*, v. 25, May 1958, p. 187-190.

Experiments were made to study concentrated wear in the form of grooves which develop on the clearance face of a carbide-tipped tool when steel is turned. The work indicated that the origin of the concentrated wear under the trailing edge of the tool is not attributable to a local minute breakdown of the cutting edge. The condition of the surface layer of the work affects the intensity of localized wear under the trailing edge, but it does not appear that work-hardening is the sole cause of groove-formation.

11267 The Forging of Heat-Resisting Metals. A. H. Waine and J. R. Rait. *Metal Treatment and Drop Forging*, v. 25, May 1958, p. 191-196.

After briefly indicating the properties of heat-resisting metals, various forging aspects and metallurgical factors are discussed, followed by some new developments and processes being introduced in order to solve problems associated with the forging of materials which have been specially developed to offer strength at elevated temperatures.

11268* 2 Ways to Machine Titanium Honeycomb. Allen C. Gilbraith. *Modern Metals*, v. 14, no. 3, Apr. 1958, p. 78.

The honeycomb is filled with water, quick frozen, machined, and then thawed out. Another method involves cementing a piece of phenolic or Al sheet to the bottom of the honeycomb; a vacuum check holds down the material during machining.

11269* (Russian.) Automatic Machine for Cutting a Thread Simultaneously at Both Ends of a Stud. **Avtomat dlia nakatyvaniia rez'by odnovremenno na dvykh kontsakh shpil'ki.** N. A. Tikhomirov and N. G. Bartenev. *Stanki i Instrument*, v. 24, no. 4, Apr. 1958, p. 21-22.

11270* High-Speed Cutting With Ceramic Tools. H. J. Siekmann. *Tool Engineer*, v. 40, no. 4, Apr. 1958, p. 85-88.

Due to the physical properties of ceramic or cemented oxide materials, the higher negative rake tools have been found to give longer tool life and more reliable cutting performance. Cutting tests were conducted on very hard steels with negative rakes as high as 30° with optimum results. The cutting forces incurred with the higher negative rakes are not higher than those incurred with positive rakes. Over a speed range from 0 to 18,000 fpm, the cutting forces drop rapidly as speed is increased.

11271* Effects of Chip Compression on Cutting Forces. Max Kronenberg. *Tool Engineer*, v. 40, no. 4, Apr. 1958, p. 89-93.

Derives a mathematical relationship between chip compression, the coefficient of friction, and tool rake angles. This makes it possible to calculate cutting forces without dynamometer measurements.

See also: **10771** (tape-controlled production line); **11020** (fabrication of high temperature materials); **11109** (fabrication of Ti); **11219** (paraffin wax as a plastic deformation model); **11380** (fabrication of fuel elements).

METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES

11272 (English.) **The Mode and Morphology of Massive Transformations in Cu-Ga, Cu-Zn, Cu-Zn-Ga and Cu-Ga-Ge Alloys.** T. B. Massalski. *Acta Metallurgica*, v. 6, Apr. 1958, p. 243-253.

In extreme cases massive phases form by a very rapid growth of incoherent grain boundaries, and possess no crystallographic relationship with respect to the parent phase. In less extreme cases partially coherent nucleation, resembling martensitic nucleation, is probably taking place.

11273 (English.) **Grain Growth in Zone-Refined Lead.** G. F. Bolling and W. C. Winegard. *Acta Metallurgica*, v. 6, Apr. 1958, p. 283-287.

Experiments between 168 and 318 C.

11274 (English.) **Thermodynamics of Phase Diagrams of Binary Systems Involving Compounds.** C. Wagner. *Acta Metallurgica*, v. 6, May 1958, p. 309-319.

Formulas are derived in order to calculate the free energy of formation of a binary compound of virtually invariable composition from the components with the help of phase diagram data and heats of fusion.

11275* (Russian.) Diffusion of Cadmium and Tin in Cd-Sn Alloy. **O diffuzii kadmiia i olova v splave Cd-Sn.** G. A. Akhundov and G. B. Abdullaev. *Akademiia Nauk Azerbaidzhanskoi SSR, Doklady*, v. 14, no. 2, 1958, p. 103-104.

11276* (Russian.) The Recrystallization Diagram of Tantalum. **Diagramma rekristallizatsii tantala.** E. M. Savitskii, M. A. Tylkina, and I. A. Tsyganova. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 4, Feb. 1, 1958, p. 720-722 + 1 plate.

Size of grains, degree of deformation, and temperature of annealing of cast Ta by means of an electric arc under vacuum or protecting gas.

11277* (Russian.) The Process of Carbide Formation in Steel Tempering as Related to Reversible Brittleness. **O sviazi protsessa karbidoobrazovaniia pri otpuske stali s iavleniem obratimoi otpusknoi khrupkosti.** L. M. Utevskii. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 1, Mar. 1, 1958, p. 79-82.

11278* (Russian.) The Diffusion of Components in Tl_2Se Studied by Means of Labelled Atoms. **Izuchenie diffuzii komponentov v Tl-Se metodom mechenykh atomov.** G. A. Akhundov and G. B. Abdullaev. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 267.

11279* (Russian.) Rhenium Recrystallization Diagram. **Diagramma rekristallizatsii reniia.** E. M. Savitskii, M. A. Tylkina, and K. B. Povarova. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 274-277 + 1 plate.

11280 Growth Conditions for Equiaxed Crystals in Aluminum-Magnesium Alloys. T. S. Plaskett and W. C. Winegard. *American Society for Metals, Transactions*, v. 51; *Preprint No.* 77, 1958, 15 pp. (TS300 Am35t Vis.)

Breakdown from columnar growth to equiaxed growth was found to be dependent upon the rate of solidification, the temperature gradient in the liquid ahead of the solid-liquid interface, and the solute concentration. It is suggested that constitutional supercooling ahead of the dendritic interface promotes nucleation in the melt.

11281 The Solubility of Hydrogen in Magnesium. J. Koeneman and A. G. Metcalfe. *American Society for Metals, Transactions*, v. 51; *Preprint No.* 78, 1957, 15 pp. (TS300 Am35t Vis.)

The solubilities in cc of H per 100 gm of Mg are 31 at 640, 46.5 at 675, 60 at 725, and 63 at 775 C.

11282 Aging Characteristics of Hastelloy B. R. E. Clausing, P. Patriarca, and W. D. Manly. *American Society for Metals, Transactions*, v. 51; Preprint No. 79, 1957, 9 pp. (TS300 Am35t Vis.)

11283* (German.) Isolating Sulfide Inclusions and Relation Between the Properties of Steel and of the Inclusions. **Über die Isolierung von Sulfideinschlüssen und Zusammenhänge zwischen Stahl- und Einschlusseigenschaften.** Kurt Born. *Archiv für das Eisenhüttenwesen*, v. 29, no. 3, Mar. 1958, p. 179-187 + 1 plate.

A nearly complete isolation of sulfide inclusions in killed steel was carried out by decarbonizing the anodes and dissolving the residual cementite by quenching from 700 C, followed by electrolysis and group separation.

11284* (German.) Investigations of the Structure of the System Iron-Chromium-Carbon. **Untersuchungen über den Aufbau des Systems Eisen-Chrom-Kohlenstoff.** Karl Bungardt, Ernst Kunze, and Elisabeth Horn. *Archiv für das Eisenhüttenwesen*, v. 29, no. 3, Mar. 1958, p. 193-203.

Structure of the Fe summit of the system Fe-Cr-C, with contents as high as 4% C and 38% Cr. Condition of the melt surface, four phase levels in the solidification range and in the solid state, and transformation points. Composition of carbides.

11285 (French.) Mechanism of the Fragility Developed in Solid Aluminum-Zinc and Aluminum-Zinc-Magnesium Solutions. **Sur le mécanisme de la fragilisation des solutions solides aluminium-zinc et aluminium-zinc - magnésium.** Pierre Gobin and Jean Montuelle. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 12, Mar. 24, 1958, p. 1853-1856.

A study of the weakening of intergranular cohesion in these solutions at room temperature and with no corrosion. The fragility was found to be due to a condensation of the vacancies in the grain boundaries.

11286* (English.) **The Sub-Structure of Crystals of Silicon-Iron Alloy.** Bohdan Šesták. *Czechoslovak Journal of Physics*, v. 8, no. 1, 1958, p. 90-93.

After electrolytic polishing and etching, a network of boundaries between mosaic blocks was observed on the surface of single crystals prepared from the melt. Some of the boundaries are formed by a number of distinguishable pits, also found singly outside the boundary. Explanation is based on the conception that the pits are etched points of intersection of edge dislocations with the surface of the crystals.

11287* (English.) **The Deformation Texture of β-Tin. I. Compression Texture. II. Rolling Texture.** Karel Toman and Marie Simerská. *Czechoslovak Journal of Physics*, v. 8, no. 1, 1958, p. 94-107.

Measurement of texture produced by rolling or compressing samples at temperatures of 20, −80, and −180 C by the reflection method on a Schulz diffractometer by measuring the pole figures of the (200) and (101) planes. Results show that the produced texture depends on temperature.

11288* (English.) **Etch Figures on Silicon Iron.** František Kroupa. *Czechoslovak Journal of Physics*, v. 8, no. 2, 1958, p. 186-195 + 2 plates.

Steps, which in some points of the (110) planes become spiral pits, were obtained on the surface of silicon iron by electrolytic etching.

11289* (Czech.) Effect of Ni, Cu, and Mn on the Spheroidization of Cementite in Ball-Bearing Steels. **Vliv niklu, mědi a manganu na sferoidisaci cementitu v ocelích pro kuličková ložiska.** Rudolf Štefec and F. Labonek. *Hutnické Listy*, v. 13, no. 5, May 1958, p. 407-412.

11290 Surface Structure of Slip Bands on Copper Fatigued at 293°, 90°, 20°, and 4.2°K. D. Hull. *Institute of Metals, Journal*, v. 86, pt. 9, May 1958, p. 425-430.

The slip bands produced during the fatigue deformation of high-purity Cu at temperatures between 293 and 4.2 K. were studied with the optical and electron microscopes. The observations are discussed in terms of recent theories of extrusion and intrusion.

11291 Note on a Redetermination of the Aluminium-Gallium Equilibrium Diagram. J. W. H. Clare. *Institute of Metals, Journal*, v. 86, pt. 9, May 1958, p. 431-432.

Thermal analysis was used to establish the form of the Al-Ga diagram. A tentative solidus was established down to 300 C by a metallographic examination of annealed and quenched alloys.

11292 Carbide Precipitation in Several Steels Containing Cr and V. Arun K. Seal and R. W. Honeycombe. *Iron & Steel*, v. 31, no. 6, May 1958, p. 221-225.

This investigation completely supports the view that the behavior of an alloy steel on tempering depends primarily on the behavior of the carbide dispersion which is formed.

11293 The Metallography of Low-Carbon Bainitic Steels. K. J. Irvine and F. B. Pickering. *Iron & Steel*, v. 31, no. 6, May 1958, p. 247-255.

A quantitative examination was made of the metallography of low-carbon bainitic steels and a relationship obtained between tensile strength or transformation temperature and the structural features.

11294 Vanadium and Molybdenum Steels. Effect of Ta and Nb on Tempering. Arun K. Seal and R. W. K. Honeycombe. *Iron & Steel*, v. 31, no. 6, May 1958, p. 256-263.

These experiments show that, in the appropriate steels, V_4C_3 and Mo_2C can be detected by electron microscopy and electron diffraction just prior to the secondary-hardening peak.

11295 Transformation Characteristics. Variations Within Samples of an Alloy Steel. W. Steven and D. R. Thorneycroft. *Iron & Steel*, v. 31, no. 6, May 1958, p. 274-284.

The longitudinal and transverse variations in hardenability that existed within the ingot and between the three sizes of material are due to variations in the intensity of microsegregation of the principal alloying elements Ni, Cr, Mn, and possibly of Mo and P. Hot-working operations, such as forging and rolling, only slightly reduce the intensity of microsegregation, but prolonged diffusion-annealing treatment at high temperature produces almost complete chemical homogeneity and eliminates the hardenability variations.

11296 Production of Dislocations During Growth From the Melt. W. A. Tiller. *Journal of Applied Physics*, v. 29, Apr. 1958, p. 611-618.

The segregation of solute on a microscopic scale during crystal growth leads to the introduction of dislocation lines at the bounding surfaces of the segregate. A layer type of segregate resulting from platelet growth leads to dislocation densities of 10^9-10^{11} lines/cm^2. A cellular type of segregation resulting from cellular or dendritic growth leads to dislocation densities of 10^6-10^8 lines /cm^2.

11297 Orientation Study of Ultra-Thin Molybdenum Permalloy Tape. P. K. Koh. *Journal of Applied Physics*, v. 29, Apr. 1958, p. 636-657.

Quantitative pole density stereograms of $\{111\}$, $\{220\}$, $\{200\}$, and $\{113\}$ poles of 1/8 mil Mo Permalloy tape were developed in order to establish its cold-rolled deformation texture and annealed textures.

11298* (Russian.) The Effect of Plastic Deformation on Martensite Transformation. **Vliianie plasticheskoi deformatsii na martensitnoe prevrashchenie.** M. G. Gaidukov and V. D. Sadovskii. *Metallovedenie i Obrabotka Metallov*, 1958, no. 4, Apr., p. 2-7.

The intensity of transformation decreases with increasing interval between the temperature of martensite point and that of plastic deformation.

11299 (German.) The Practice of Grain Refinement of Aluminum and Aluminum Alloys. **Die Praxis der Kornfeinung von Aluminium und Aluminium-Legierungen.** Elfriede Dittrich. *Neue Hütte*, v. 3, no. 2, Feb. 1958, p. 93-101.

11300 Diffusion of Iron, Cobalt, and Nickel in Single Crystals of Pure Copper. C. A. Mackliet. *Physical Review*, v. 109, ser. 2, no. 6, Mar. 15, 1958, p. 1964-1970.

Rates of diffusion were measured as a function of temperature between 700 and 1075 C.

11301 Electrical Methods for Determining the Positions of Dislocation Regions in Germanium. C. A. Hogarth and A. C. Baynham. *Physical Society, Proceedings*, v. 71, Apr. 1958, p. 647-653.

The walls of edge dislocations which exist in Ge crystals grown on a deformed seed are regions of high electrical conductivity in both n- and p-type samples.

11302* (French.) Some Transformation Structures in Manganese Austenitic Steels. **Quelques structures de décomposition des aciers austénitiques au manganèse.** René Castro and Pierre Garnier. *Revue de Métallurgie*, v. 55, no. 1, Jan. 1958, p. 17-23.

Determining the transformation structures observed in 12-15% Mn steel by isothermal treatment. Relationship between the thermal history of pieces out of service and their micrographic structure. Conditions of heat treatment and analysis.

11303* (French.) Effect of Rapid Cooling on the Growth of Aluminum Single Crystals. **Influence d'un refroidissement brusque sur la croissance des monocristaux d'aluminium.** H. Latière. *Revue de Métallurgie*, v. 55, no. 2, Feb. 1958, p. 145-165.

Differences in results of continuous annealing and of successive anneals. Macro-examination and X-rays determined the effects on grain growth of quenching temperature and speed, time after quenching, and quenching distortions.

11304* (French.) The Formation of Proeutectoid Ferrite in Plain Carbon Steels. **La formation de la ferrite proeutectoïde dans les aciers au carbone.** C. A. Dubé, H. I. Aaronson, and R. F. Mehl. *Revue de Métallurgie*, v. 55, no. 3, Mar. 1958, p. 201-210.

Five major types of morphologies of proeutectoid ferrite. Effects of isothermal reaction temperature and time, C content, austenite grain size, and pearlite formation, on the development of each type.

11305* (French.) Study of the Diffusion of Sulfur in Steels. **Etude de la migration du soufre dans l'acier.** A. Kohn. *Revue de Métallurgie*, v. 55, no. 3, Mar. 1958, p. 265-274.

Autoradiographic investigation of Fe alloys with a small amount of S-35. Small ingots were subjected to heat treatments in a purified Ar atmosphere from 900 to 1300 C.

11306 Continuous Distributions of Dislocations. IV. Single Glide and Plane Strain. B. A. Bilby, R. Bullough, L. R. T. Gardner, and E. Smith. *Royal Society, Proceedings*, v. 244, ser. A, Apr. 22, 1958, p. 538-557.

Details the case where the single glide is also in one crystallographic direction only and the deformation is two-dimensional.

11307 (German.) The Damping of Metals. **Die Dämpfung von Metallen.** R. Fichter. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 24, no. 3, Mar. 1958, p. 65-78.

Damping for investigating the structure of metals. Nondestructive testing by damping measurements.

11308 Characteristics of the Solid State Transformations in Uranium. Harold H. Klepfer and P. Chiotti. *U. S. Atomic Energy Commission, ISC*-893, June 1957, 113 pp. (UF767 Un3.1is Contin.)

11309* (Russian.) Determination of the Diffusion Rate of Hydrogen in Metals. **Opredelenie skorosti diffuzii vodoroda v metallakh.** R. A. Riabov and P. V. Gel'd. *Zavodskaia Laboratoriia*, v. 24, no. 3, 1958, p. 306-308.

Special equipment to determine the temperature dependence of the diffusion rate for a series of iron alloys and structural steels.

11310* (Russian.) Quantitative Evaluation of the Degree of Transformation of Steel by Dilatometric Curves. **K voprosu o kolichestvennoi otsenke steleni prevrashcheniia v stali po dilatometricheskim krivym.** Iu. A. Kocherzhinskii. *Zavodskaia Laboratoriia*, v. 24, no. 4, 1958, p. 437-439.

11311* (German.) Structural Analyses Within the Copper-Antimony System. **Strukturuntersuchungen im System Kupfer-Antimon.** Eberhard Günzel and Konrad Schubert. *Zeitschrift für Metallkunde*, v. 49, no. 3, Mar. 1958, p. 124-133.

The $Cu_{4.5}Sb$, $Cu_{2.2}Sb$, Cu_2Sb, $Cu_{76}Sn_{12}Sb_{12}$, and Cu_6AsSb phases were studied.

11312* (German.) Enrichment of the Slag-Preventing Elements on the Surfaces of Metal Melts. **Beitrag zur Anreicherung verkrätzungsverhindernder Elemente an Oberflächen von Metallschmelzen.** Friedrich Erdmann-Jesnitzer, Hansfriedrich Hadamovsky, and Rosemarie Görner. *Zeitschrift für Metallkunde*, v. 49, no. 3, Mar. 1958, p. 133-140.

These trace elements are distributed in two ways, depending upon the relation between the ratio of oxidation and that of diffusion of the foreign element into the melt.

11313* (German.) Monocrystals and p-n Layer Crystals From Aluminum Antimonide. **Einkristalle und pn-Schichtkristalle aus Aluminiumantimonid.** Hans Achim Schell. *Zeitschrift für Metallkunde*, v. 49, no. 3, Mar. 1958, p. 140-144.

Preparation of AlSb monocrystals by the Czochralski vertical drawing process. They were p-conductive and had an electric resistivity of 0.1 ohm-cm.

11314* (German.) Magnetic Material Control of Stainless Steel With Electron Rays. **Magnetische Materialprüfung von rostbeständigem Stahl mit Elektronenstrahlen.** Sh. Yamaguchi. *Zeitschrift für Metallkunde*, v. 49, no. 3, Mar. 1958, p. 156-157.

Ferrite contained in stainless steel can hardly be detected crystallographically because the grating constants of these two crystals are much alike. Magnetic analysis with electron rays of these substances yielded satisfactory results.

11315* (German.) A Contribution to the Study of Binary Systems of Titanium With Gallium, Indium, and Germanium, and Zirconium With Gallium and Indium. **Beitrag zu den binären Systemen des Titans mit Gallium, Indium und Germanium und des Zirkons mit Gallium und Indium.** Kurt Anderdo. *Zeitschrift für Metallkunde*, v. 49, no. 4, Apr. 1958, p. 165-172.

The partial phase diagram Ti-Ti_2Ga is established. Two intermediate phases Ti_3Ga (α_2) of the hexagonal DO_{19}-type and Ti_2Ga of the hexagonal Ni_2In (filled-up NiAs) type of structure. A cubic phase was found near 55 at.% Ga. A preliminary phase diagram for Ti-rich Ti-In alloys was worked out. Two intermediate phases could be identified: α_2 (Ti_3In) of the DO_{19}-type of structure and a cubic phase at higher In contents (about 40 at.% In). The eutectic $\beta Ti + Ti_5Ge_3$ in the system Ti-Ge was located at 15 at.% Ge.

11316* (German.) A Superstructure of the CsCl Type in the System Titanium-Molybdenum-Aluminum. **Über eine Überstrukturphase vom CsCl-Typ im System Titan-Molybdän-Aluminium.** Horst Böhm and Karl Löhberg. *Zeitschrift für Metallkunde*, v. 49, no. 4, Apr. 1958, p. 173-178.

In the Ti-Mo-Al system, along the TiMo-TiAl cut, an ordered β-phase was found which has the CsCl-type structure. The appearance of the superstructure leads to brittleness. Similar investigations in the Ti-Al, Ti-Cb-Al, Ti-V-Al, and Ti-Mo-Ga systems indicate that the superstructure initiates in the Ti-Mo system; additions of Al and Ga make it more pronounced.

11317* (German.) Hardening and Phase Changes During the Beta/Alpha-Titanium Transformation in Titanium-Cobalt Alloys. **Aushärtung und Phasenänderungen bei der Beta/Alpha-Titan-Umwandlung in Titan - Kobalt - Legierungen.** Ernst Raub and Hans Beeskow. *Zeitschrift für Metallkunde*, v. 49, no. 4, Apr. 1958, p. 185-190.

A cobalt rich transition phase (ω) formed in β-Ti-Co alloys on cooling. With less than 5% Co, β could not be quenched. Formation of metastable α-phase and possibly another transition phase.

11318* (German.) The Ternary Titanium-Vanadium-Zirconium System. **Das Dreistoffsystem Titan-Vanadin-Zirkon.** Alexej Nowikow and Hans Günter Baer. *Zeitschrift für Metallkunde*, v. 49, no. 4, Apr. 1958, p. 195-199.

Metallographic and X-ray determination of the system at 750 C. Phase theoretical considerations give an idea of the constitution expected.

11319* (Russian.) Heat Effects in the System Lead-Tin-Bismuth on Melting. **Teplovye effekty pri plavlenii v troinoi sisteme svinetsolova—vismut. III.** Calculation of the Heats of Phase Transition for Ternary Metallic Alloys. **Raschet teplot fazovykh perekhodov dlia troinykh metallicheskikh splavov.** R. B. Gershman. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 2, Feb. 1958, p. 258-261.

11320* (Russian.) Phase Diagram of the Tungsten-Boron System. **Sistemy borida titana s metallami gruppy zheleza.** G. V. Samsonov. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 4, Apr. 1958, p. 847-860.

11321* (Russian.) The Structural Diagram of the Niobium-Tungsten System. **Diagramma sostoianiia sistemy niobii-vol'fram.** V. S. Mikheev and D. M. Pevtsov. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 4, Apr. 1958, p. 861-867.

11322* (Russian.) The Structural Diagram of the Titanium-Niobium-Molybdenum Ternary System. **Diagramma sostoianiia troinoi sistemy titan-niobii-molibden.** I. I. Kornilov and R. S. Poliakova. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 4, Apr. 1958, p. 879-888 + 1 plate.

11323* (Russian.) The Study of the Constitution Diagram of the Ternary System Chromium-Tungsten-Molybdenum. **Izuchenie diagrammy sostoianiia troinoi sistemy khrom—vol' fram-molibdei. I.** The Microscopic and X-Ray Structural Analysis of Alloys. **Mikroskopicheskoe i rentgenostrukturnoe issledovanie splavov.** N. V. Grum-Grzhimailo and D. I. Prokof'ev. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 5, May 1958, p. 1220-1226 + 3 plates.

See also: **10840** (austenite structure revealed by electropolishing); **11110** (low Cu, Mn brasses); **11127** (influence of Si content on growth of cast iron); **11137** (diffusion of O in Zr); **11191** (Ta and Nb structures in tempering V and Mo steels); **11207** (temperature stresses in WC-Co phases); **11215** (structural properties of Al-Zn-Mg alloys); **11231** (effect of elastic strain on tin transition); **11239** (aging of steel); **11241** (microstructure of commercial Ti).

METALS—POWDER

11324* (French.) Study of Metallic Cobalt Powders Obtained by the Pyrolysis of Normal Alkanates. **Étude de poudres de cobalt métallique obtenues par pyrolyse d'alcanoates normaux.** Claude Moreau and Georges Rodier. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 12, Mar. 24, 1958, p. 1861-1864.

Preparing metallic Co of variable texture by thermal decomposition in a controlled atmosphere of anhydrous salts of fatty acids of the $(RCOO)_2$ Co type. Metallic Co was obtained near 420 C.

11325 Nickel Powder With Adsorptive Properties Approaching Those of Evaporated Nickel Films. M. W. Roberts and K. W. Sykes. *Faraday Society, Transactions*, v. 54, pt. 4, Apr. 1958, p. 548-556.

The surface of Ni powder was studied by measurement of H and krypton adsorption throughout the course of reduction in H for 102 h at 450 C. Adsorptive behavior closely approaching that known to be exhibited by evaporated Ni films has been observed as a result of a gradual improvement in surface purity. This is attributed to the removal of surface oxide by reduction and of involatile impurities by aggregation into separate phases or diffusion into the lattice.

11326 Complex Powder Metal Parts Call for Higher Density. S. Bradbury, III. *Iron Age*, v. 181, no. 23, June 5, 1958, p. 124-125.

Pressing of complex shapes requires differential motions of separate tooling members. For relatively short runs of medium-density pieces, this can be accomplished with spring-loaded or cam and latch tools. But at higher densities, such tooling cannot be relied on. This has led to the design of large-tonnage presses with three or more individual punch motions. Some offer as many as six motions. These larger presses are equipped with flexible stroke control.

11327* (German.) Compound Materials (Cermets) Made of Aluminum Oxide and Iron or Iron Alloys. **Verbundwerkstoffe aus Aluminiumoxyd und Eisen oder Eisenlegierungen.** Werner Jellinghaus and Toshimori Shuin. *Stahl und Eisen*, v. 78, no. 7, Apr. 3, 1958, p. 419-429.

Fabrication of fine-grained powder mixtures. Pressing; sintering; density; structure; tensile, creep, and impact strength; permeability; resistance to scaling; electrical resistance. Effect of Ni, Cr, and/or Mo additions, particularly on the strength at elevated temperatures.

11328 (Czech.) General Purpose Hard Alloy. **Universální slinutý karbid.** V. Dufek and M. Petrdlík. *Strojírenství*, v. 8, no. 4, Apr. 1958, p. 269-270.

The Research Institute of Powder Metallurgy has recently developed a general purpose hard alloy consisting of 86.5% WC,

5% TiC, 1% TaC, 0.5% Cr_3C_2, and 7% Co which can be used in a very wide range of various materials and working conditions. This new sintered carbide can successfully replace several single purpose types so far generally used. The carbide is compared with foreign materials of the same group. The analysis shows that besides having comparable quality in every respect, the new carbide can also be used for machining austenitic Mn steel.

See also: **11205** (electroconductivity of metal powder alloys); **11236** (electric resistance of sintered materials).

NONDESTRUCTIVE TESTING AND QUALITY CONTROL

11329* (German.) Ultrasonic Nondestructive Testing of Aluminum Work-Pieces. **Die zerstorungsfreie Prüfung von Aluminium-Werkstücken mit Ultraschallimpulsen.** W. Böhme. *Aluminium (Dusseldorf)*, v. 34, no. 4, Apr. 1958, p. 200-205.

Deeper penetration of mechanical millimeter waves than electromagnetic waves. Description of a recently developed testing rig. Ultrasonic technique.

11330* The Ultrasonic Testing of Welds. M. J. Cotter. *Atomics* (British), v. 9, no. 4, Apr. 1958, p. 115-117.

Techniques and equipment.

11331 A Portable Lamination Detector for Steel Sheet. B. O. Smith, A. P. H. Jennings, and A. G. Grimshaw. *British Journal of Applied Physics*, v. 9, May 1958, p. 191-193.

A method of detecting laminations in steel sheet based on the distortion they cause in the flow pattern of an electric current through the sheet. Better results are obtained in cold rolled sheet.

11332 How to Find Microscopic Leaks in Process Equipment. Philip Winter, H. R. Bilford, Carl E. Jacob, and R. A. Kemmerer. *Industrial and Engineering Chemistry*, v. 50, May 1958, p. 53A-55A.

11333* (French.) Contribution to Improvement of Gamma-Ray Technique. **Contribution à l'amélioration de la technique gammagraphique.** P. Ruault and R. Rath. *Revue de Métallurgie*, v. 55, no. 1, Jan. 1958, p. 39-52.

Radioisotopes available for examination of steel up to 200 mm. thick. Reduction of exposure time by overdevelopment. Reinforcement by lead screens. Quality control of the radiographic image.

11334 Symposium on Nondestructive Testing. 99 pp. 1957. American Society for Testing Materials, Philadelphia. (TA410 Am35sn)

Symposium presents the latest and most widely used techniques, together with their applications in various fields.

11335* (Japanese.) **The Cathode Ray Tube Type Ultrasonic Thickness Gauge and Its Application to Non-Destructive Inspection.** Noboru Niwa. *Tokyo University, Institute of Industrial Science, Reports*, v. 7, no. 1, Feb. 1958, 67 pp.

An improved type instrument with an electronic frequency sweeping, new electronic scaling, and limit gage systems.

11336* (German.) A New Method for Measuring Wall Thickness and the Velocity of Sound. **Eine neue Methode der Dicken- bzw. Schallgeschwindigkeitsmessung.** Ludwig Niklas *Zeitschrift für Metallkunde*, v. 49, no. 3, Mar. 1958, p. 152-155.

Wall thickness measurement by means of ultrasonic, echo-sounding instruments will become inaccurate if only a few echoes can be utilized because of either high absorption, corrosion, or unfavorable radiation geometry.

See also: **10517** (applications of X-ray analysis conference); **11263** (measurement of compressed layer of shot-peened surfaces); **11307** (damping for nondestructive testing); **11379** (radioisotopes in nondestructive testing); **11410** (radiation gage).

NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION

11337* (Russian.) Investigation of Particles Generated by Neutrons and Protons in Copper. **Issledovanie chastits, generirovannykh neitronami i protonami v medi.** Z. A. Kirakosian, et al. *Akademiia Nauk Armianskoĭ SSR, Izvestiia. Seriia Fiziko-Matematicheskikh Nauk*, v. 11, no. 1, 1958, p. 67-74.

Analyzes the spectra of π-mesons and protons originating in the proton stars in Cu.

11338* (Russian.) Conversion Spectra of Some Neutron-Deficient Isotopes of Terbium. **Konversionnye spektry nekotorykh neitronodefitsitnykh izotopov Tb.** N. M. Antonieva, A. A. Bashilov, B. S. Dzhelepov, and B. K. Preobrazhensky. *Akademiia Nauk SSSR, Doklady*, v. 119, no. 2, Mar. 11, 1958, p. 241-243.

11339* (English.) **On the Scattering of Slow Neutrons by KCl.** Alf Sjölander. *Arkiv för Fysik*, v. 13, no. 3, 1958, p. 199-214.

The one-phonon scattering surfaces for a series of neutron energies and some different crystal settings have been determined on the basis of the eigen frequencies obtained by Tenerz when using a realistic model of KCl.

11340* (English.) **On the Width of the Giant Resonance in Photonuclear Reactions.** Sven A. E. Johansson. *Arkiv för Fysik*, v. 13, no. 4, 1958, p. 331-338.

Shows in which cases the measured cross-section curves represent the total photonuclear absorption.

11341* Ship Propulsion by Nuclear Power. I. K. Illies. *Atomics* (British), v. 9, no. 5, May 1958, p. 156 + 4 pages.

One of five papers on nuclear ship propulsion, this assesses the practicability of nuclear power to ships fitted with gas turbines, with special reference to tankers. (To be continued.)

11342* Neutron-Induced Nuclear Reactions in Solids Resulting in Gas Formation. R. S. Barnes and G. B. Redding. *Atomics* (British), v. 9, no. 5, May 1958, p. 166 + 2 pages.

Eighteen reactions are considered.

11343 Modular Redesign of Reactor Instrumentation. J. L. Cockrell, D. F. Ryan, and J. H. Magee. *Automatic Control*, v. 8, no. 5, May 1958, p. 11-15.

Work done at Oak Ridge National Laboratory.

11344* Thermal Problems of Atomic Power Stations. III. Pressure Loss and Flow Distribution in a Gas-Cooled Reactor. L. S. Dzung. *Brown Boveri Review*, v. 45, no. 1, Jan. 1958, p. 14-20.

The basic flow equations. Approximation solution. Flow distribution. Temperature curves. Adaptation of channel dimensions.

11345 Angular Energy Flux of Secondary Gamma-Rays in Matter: Small-Angle Scattering From a Point Isotropic Source. W. R. Dixon. *Canadian Journal of Physics*, v. 36, Apr. 1958, p. 419-430.

For small angles and for energies near the incident energy, only a few orders of scattering contribute to the angular energy flux out to considerable thicknesses, whereas for large angles and low energies many orders of scattering contribute even for small thicknesses.

11346 Radioactive Isotopes of Rhenium and Osmium Formed by the Bombardment of Rhenium With Protons. J. S. Foster, J. W. Hilborn, and L. Yaffe. *Canadian Journal of Physics*, v. 36, May 1958, p. 555-564.

The isotopes Os^{185}, Os^{182}, Re^{183}, and Re^{181}, Os^{181}, Re^{180}, and Os^{180} were formed and examined.

11347* (French.) Determining the Energy of the Isomeric State of 8.15 Hours of ^{180}Ta, by Means of Betatron. **Détermination, à l'aide du bétatron, de l'énergie de l'état isomérique de 8,15 h de ^{180}Ta.** Mark Gusakow and Robert Basile. *Comptes Rendus Hebdomadaires des Séances de l'Academie des Sciences*, v. 246, no. 17, Apr. 28, 1958, p. 2464-2466.

Study of the reaction $T^{181}(\gamma, n)$ ^{180}Ta near the threshold in order to determine this energy by measuring the difference of

the threshold (γ, n) by detecting the photoneutrons directly, and the induced activity of 8.15 hr. on the nuclei of residual ^{180} Ta.

11348* (Russian.) Measurement of Electron Concentration of Plasma in Toroidal Resonator. **Izmerenie elektronnoi plotnosti plazmy razriada v toroidnom rezonatore.** Miloš Šicha and Vítězslay Veselý. *Czechoslovak Journal of Physics*, v. 8, no. 2, 1958, p. 256-257.

11349 Economic Applications of Atomic Energy. Power Generation and Industrial and Agricultural Uses. 108 pp. 1957. United Nations, New York. (HD9698 Un2.7e Over.)

An analysis of the role of nuclear energy as a source of electric power and of present and potential uses of radioactive materials and radiation in industrial applications, food processing, plant breeding, and agricultural research.

11350* (German.) Basic Problems in the Simulation of Reactor Dynamics. **Grundsätzliche Aufgaben bei der Nachbildung der Reaktordynamik.** H. Rechberger and H. Sequenz. *Elektrotechnik und Maschinenbau*, v. 75, no. 6, Mar. 1958, p. 117-122.

Discusses basic equations in the analysis of reactor dynamics; chain reactions, retarded neutrons, temperature effects, and the Xe effect.

11351* (French.) The Problems of the Marcoule Plutonium Plant and Their Solution. **Les problèmes posés par l'usine de plutonium de Marcoule et leurs solutions.** R. Galley. *Énergie Nucléaire*, v. 2, no. 1, Jan.-Mar. 1958, p. 2-20.

Technical problems of Pu extraction connected with the low Pu content of U bars, with the considerable radiation inside the plant, and the protection required. Description of the separation process, concentration, and storage.

11352 An Experimental Study of Neutron Induced Activities in Water. N. Faull. *Great Britain, Atomic Energy Research Establishment, A.E.R.E. R/R* 1919, 39 pp. (UF767 G79.1a Contin.)

The fast neutron reactions $O^{16}(n,p)N^{16}$ and $O^{17}(n,p)N^{17}$ of O (as water) were studied.

11353 A Growth Survey of the Atomic Industry 1958-1968. Frederick H. Warren, William W. Lowe, and James K. Pickard. 84 pp. 1958. Atomic Industrial Forum, Inc., New York. (QC792 At71g Over.)

Data on rate of construction of nuclear reactors in the U. S., nuclear plant costs and markets, foreign nuclear reactor activities, and reactor fuel cycles.

11354 The Homogeneous Aqueous Reactor. R. Hurst, I. Wells, and D. Newby. *Institution of Chemical Engineers, Transactions*, v. 36, no. 2, 1958, p. 91-106.

A study of a 100 m.w.e. breeder reactor is given in order to show the kind of system which is being developed, and to indicate the types of problem still to be solved. Converter and burner reactor are also discussed.

11355 Introduction to Reactor Physics. A. A. Markson. *Instruments and Automation*, v. 31, Apr. 1958, p. 616-623.

Covers nuclear structure, energies in nuclear bonds, environment required for a chain reaction, and reactor types.

11356 Reactor Control. R. N. Brey, Jr. *Instruments and Automation*, v. 31, Apr. 1958, p. 630-635.

Survey of reactor kinetics, detector ranges, and intrumentation of low-power test and medium-power boiling-water reactors.

11357 Irradiation Sources for Industry. Morris R. Jeppson. *Instruments and Automation*, v. 31, Apr. 1958, p. 639-643.

Compares advantages and costs of radioactive waste and other reactor sources vs. accelerators of various types.

11358 Introduction to Atomic Physics for Engineers. A Course in Aspects of Modern Physics Underlying Important Engineering Developments. I. The Rise of Atomic Physics. III. Nuclear Physics. Paul L. Copeland and William E. Bennett. 125 and 56 pp. 1957. Edwards Brothers, Inc., Ann Arbor. (QC28 C79i Over.)

11359 Fast Neutron Attenuation in Graphite. V. P. Duggal and S. M. Puri. *Journal of Applied Physics*, v. 29, Apr. 1958, p. 675-679.

Spatial distribution of a fast neutron flux was measured in graphite (density 1.62 g/cc) using threshold radioactivants.

11360 Neutron Penetration in Infinite Media: Calculation by Semi-Asymptotic Methods. Samuel S. Holland, Jr. *Journal of Applied Physics*, v. 29, May 1958, p. 827-833.

Method can handle complete numerical input data and is not restricted in distance. Calculations are carried out for the ideal constant cross section case and a one kev. point source in air.

11361* Suppression of Plasma Oscillations. D. W. Mahaffey and K. G. Emeleus. *Journal of Electronics and Control*, v. 4, no. 4, Apr. 1958, p. 301-304.

The basic process occurring is the excitation of coherent plasma electron oscillations by the passage through the plasma of nearly monoenergetic primary electron beams.

11362 Measurement of the Ratio of Absorption Cross-Section to Fission Cross-Section to Fission Cross-Section for ^{233}U, ^{235}U, ^{239}Pu With 0.0011 eV Neutrons. S. J. Cocking. *Journal of Nuclear Energy*, v. 6, no. 4, May 1958, p. 285-290.

Values given are measured by a new method which yields absolute values.

11363 The Slow-Neutron Resonance Behaviour of Plutonium Isotopes. P. A. Egelstaff, D. B. Gayther, and K. P. Nicholson. *Journal of Nuclear Energy*, v. 6, no. 4, May 1958, p. 303-321.

The neutron total cross-sections of several Pu samples Pu^{239}, Pu^{240}, Pu^{241}, and Pu^{242} were measured from 0.02 ev. to 51 kev. using the Harwell fast chopper.

11364* (French.) The Graviton in the Functional Theory of Particles. **Le graviton en théorie fonctionnelle des corpuscules.** Jean-Louis Destouches. *Journal de Physique et la Radium*, v. 19, no. 2, Feb. 1958, p. 135-139.

Fundamental equations for the particle of maximum spin 2 (graviton), in the functional theory of particles. Various forms of these equations. Physical fields and their equations.

11365 Neutron Cross Sections. Donald J. Hughes. 182 pp. 1957. Pergamon Press, New York. (QC173 H87n)

Planned for the reader who has no background in nuclear theory. Includes types of cross sections and principles of measurement; nuclear structure; fast neutrons; neutron resonances; resonances in fissionable materials; thermal neutrons.

11366 (French.) Nuclear Chemistry and Its Applications. **La Chimie Nucléaire et ses Applications.** M. Häissinsky. 651 pp. 1957. Masson et Cie, Paris. (QD601 H12c)

Written for the scientific worker, offering a synthetic presentation of the knowledge accumulated in the domain of the transformations of matter at the nuclear level, thus involving nuclear chemistry, radiochemistry, radiation chemistry, and their applications.

11367 Nuclear Energy in the South. Redding S. Sugg, Jr. 151 pp. 1957. Louisiana State University Press, Baton Rouge. (HD9608.U5 Su34n)

A comprehensive analysis of the South's current situation in regard to nuclear development, and the action necessary for achievement of a dominant place in the national economy. A plan for an interstate compact for nuclear development is presented.

11368* Chemical Processing for Nuclear Energy—Its Problems and Importance. D. A. Collins and J. S. Nairn. *Nuclear Engineering*, v. 3, no. 26, May 1958, p. 191-197.

Improvements in fuel element economy lead to more chemically intractable fuel in even more intractable canning. Discusses some of the problems arising.

11369* The Sub-Critical Facility for Merlin. *Nuclear Engineering*, v. 3, no. 26, May 1958, p. 198-202 + 1 plate.

Facility design provides an elegant solution to the problem of an extensive research program in absolute safety.

11370* Removal of Decay Heat From a Plate-Type Fuel Subassembly in the Atmosphere. R. E. Grimble and B. W. LeTourneau. *Nuclear Science and Engineering*, v. 3, May 1958, p. 529-539.

Estimates how much heat may be removed from a fuel element subassembly in air.

11371* (Italian.) Photoprotons From Oxygen. **Fotoprotoni dall' ossigeno.** C. Milone, et al. *Nuovo Cimento*, v. 7, ser. 10, no. 6, Mar. 16, 1958, p. 729-741.

Study of ^{16}O (γ,p) reaction by exposing an O gas target to the γ-rays of the B.B.C. betatron of 31 m.e.v. maximum energy. Exposures at 23, 26, and 30 m.e.v.

11372 Our Nuclear Future—Facts, Dangers, and Opportunities. Edward Teller and Albert L. Latter. 184 pp. 1958. Criterion Books Inc., New York. (QC778 T23O)

A concise and authoritative account of what is known about the basic nuclear processes. Effects of radioactivity, bomb fallout, possible military uses, and the probable consequences of nuclear fission and fusion are analyzed for the layman.

11373 (English.) **Directional Distribution of Alpha Particles Emitted by Oriented Nuclei.** P. J. Brussaard and H. A. Tolhoek. *Physica*, v. 24, no. 4, Apr. 1958, p. 233-262.

The theory of α emission of spheroidally deformed nuclei is explained, especially in view of the experiments on this directional distribution.

11374 (English.) **On the Internal Bremsstrahlung in the ^{204}Tl Beta Decay.** R. A. Ricci. *Physica*, v. 24, no. 4, Apr. 1958, p. 297-303.

Results are compared with the theoretical distributions calculated on the basis of the Knipp and Uhlenbeck theory.

11375 (p,n) Cross Sections of Copper and Zinc. H. A. Howe. *Physical Review*, v. 109, ser. 2, no. 6, Mar. 15, 1958, p. 2083-2085.

11376* (English.) **On the Low Lying Levels of Mn^{55}.** Sadaaki Yanagawa. *Physical Society of Japan, Journal*, v. 13, Apr. 1958, p. 323-324.

Values are determined from the experimental data of the energy splittings of the $J=O$, 2 and 4 levels for Fe^{56}.

11377* (English.) **Alpha Particles From the Interaction of 14.8-Mev Neutrons With Medium Weight Nuclei.** Isao Kumabe. *Physical Society of Japan, Journal*, v. 13, Apr. 1958, p. 325-334.

Angular and energy distributions of α particles resulting from $V^{51}(n,\alpha)Si^{48}$ and $S^{32}(n,\alpha)Si^{29}$ reactions were measured.

11378* **Progress on Specific Reactor Types.** *Power Reactor Technology*, v. 1, no. 1, Dec. 1957, p. 34-41.

Design data on gas-cooled, boiling water, heavy water moderated, and training reactors.

11379 Radioisotopes. A New Tool for Industry. Sidney Jefferson. 110 pp. 1958. Philosophical Library, New York. (TK9145 J35r)

Industrial applications of radioisotopes include radioactive marking, leak detection, checking thoroughness of mixing, thickness measurements, level and density gages, and radiography. The elementary fundamentals of radioactivity are discussed.

11380* *Reactor Core Materials*, v. 1, no. 1, Mar. 1958, 40 pp.

Reviews recent developments in fuel and fertile materials, moderator and control materials, special fabrication techniques, corrosion, and radiation effects.

11381 Continuous Energy Monitor for the External Beam of a Cyclotron. J. A. Northrop and R. H. Stokes. *Review of Scientific Instruments*, v. 29, Apr. 1958, p. 287-290.

A simple scintillation system which monitors the average energy of particles in the external beam of a cyclotron and simultaneously serves as a current integrator.

11382 Liquid Hydrogen Bubble Chamber Expanded by a Piston in the Liquid. E. M. Bolze, et al. *Review of Scientific Instruments*, v. 29, Apr. 1958, p. 297-299.

11383 A Resonance Model for Pion Production in Nucleon-Nucleon Collisions at Fairly Low Energies. S. Mandelstam. *Royal Society, Proceedings*, v. 244, ser. A, Apr. 22, 1958, p. 491-523.

11384 Elastic Scattering of 307 Mev Negative Pions by Hydrogen. S. M. Korenchenko and V. G. Zinov. *U. S. Atomic Energy Commission, AEC-tr*-3027, Mar. 1957, 8 pp. (UF767 Un3.1ae Contin.)

(Translated from the Russian.)

11385 Preparation of Radiation Sources From Fission Products by the Clay Process. J. E. Schoolmeester and J. J. Martin. *U. S. Atomic Energy Commission, AECU*-3618, Aug. 1957, 14 pp. (UF767 U3au Contin.)

Analysis of the feasibility of producing usable radiation sources by the montmorillonite clay process showed that sources may be prepared with specific activity as high as 4.5 curies of Cs-137 per g. of clay.

11386 Borax-IV Reactor: Manufacture of Fuel and Blanket Elements. D. E. Walker, R. A. Noland, F. D. McCuaig, and C. C. Stone. *U. S. Atomic Energy Commission, ANL*-5721, Mar. 1958, 75 pp. (UF767 Un3.1an Contin.)

Procedures used in fabricating the core leading for the natural water-cooled Borax-IV reactor, which contains fissile (U^{235}) and/or fertile (Th^{232}) material in ceramic form.

11387 EBR-I, Mark III—Design Report. R. E. Rice, et al. *U. S. Atomic Energy Commission ANL*-5836, Mar. 1958, 42 pp. (UF767 Uu3.1an Contin.)

The EBR-I reactor was designed to demonstrate the feasibility of power production with a liquid metal-cooled, fast neutron reactor and to demonstrate that such a reactor could breed fissionable material.

11388 Fused Salts as Thermonuclear Reactor Breeder Blankets. D. M. Gruen. *U. S. Atomic Energy Commission, ANL*-5840, Mar. 1958, 8 pp. (UF767 Un3.1an Cnotin.)

The possibility of using $Li(NO_3)_2$ is discussed.

11389 Progress Realting to Civilian Applications During November, 1957. Russell W. Dayton and Clyde R. Tipton, Jr. *U. S. Atomic Energy Commission, BMI*-1238, Dec. 1, 1957, 70 pp. (UF767 U3b Contin.)

A progress report of work in 13 selected fields.

11390 Studies of Upper-Plenum Coolant Circulation in a Quarter-Scale Air-Flow Model of the PWR. Alexander R. Orban and Herbert R. Hazard. *U. S. Atomic Energy Commission, BMI*-1258, Mar. 18, 1958, 42 pp. (UF767 U3b Contin.)

Exploration of flow patterns and velocities throughout the upper plenum showed that circulation of coolant throughout the upper plenum was satisfactory with either of the hold-down barrels investigated.

11391 Brookhaven National Laboratory Annual Report, July 1, 1957. *U. S. Atomic Energy Commission, BNL*-462, 1957, 149 pp. (UF767 Un3.1bn Contin.)

Progress and trends of the research program are presented along with a description of the operational, service, and administrative activities of the laboratory.

11392 Table of Radioisotopes Arranged According to Half-Life. Elaine Daniels, compiler. *U. S. Atomic Energy Commission, BNL*-487 (T-112), Dec. 1957, 58 pp. (UF767 Un3.1bn Contin.)

From the General Electric Chart of the Nuclides, fifth edition (April, 1956).

11393 Fractional Precipitation Processes for Liquid Metal Fuels. Robert J. Teitel. *U. S. Atomic Energy Commission, BNL*-3472, Mar. 1958, 23 pp. (UF767 Un3.1bn Contin.)

Data on the distribution of rare earth tracers between precipitated U inter-metallic compounds and their liquid phases are discussed. A complete processing cycle is proposed and tested for the U-Sn_3 in Pb-Bi-Sn dispersion fuel systems.

11394 Design Study of an Advanced Test Reactor. W. L. Carter, et al. *U. S. Atomic Energy Commission, CF*-57-8-5, Aug. 1957, 208 pp. (UF767 Un3.1cf Contin.)

A conceptual design of an advanced engineering test reactor with unperturbed thermal fluxes as high as 2.48×10^{15} neutrons/cm^2-sec is presented.

11395 Power Reactor Studies, Quarterly Progress Report, Aug.-Oct. 1957. L. Isakoff, complier. *U. S. Atomic Energy Commission, DP*-265, Feb. 1958, 79 pp. (UF767 Un3.1dp Contin.)

An evaluation of gas cooling vs. heavy water cooling for power reactors fueled with natural U metal and moderated with heavy water. Basic physics data, engineering design problems, metallurgical developments, and cost estimates are included.

11396 Heavy Water Moderated Power Reactors, Quarterly Progress Report. L. Isakoff, compiler. *U. S. Atomic Energy Commission, DP-285*, Mar. 1958, 55 pp. (UF767 Un3.1dp Contin.)

The currently preferred design consists of a large pressure-vessel reactor that employs tubes of metallic U as fuel and hot D_2O as moderator and coolant.

11397 Disposal of Radioactive Liquid Wastes From the Uranium Recovery Plant. D. W. Rhodes and J. L. Nelson. *U. S. Atomic Energy Commission, HW-54721*, June 3, 1957, 34 pp. (UF767 Un3.1hw Contin.)

The long-lived radioisotopes Cs^{137} and Sr^{90} were considered to be the limiting radioisotopes in this waste and conditions were adjusted to obtain optimum removal of these radioisotopes by soil.

11398 Pile Production of Plutonium-240 From Plutonium-239 Irradiated Under Time Variable Flux Conditions. R. J. Howerton. *U. S. Atomic Energy Commission, IDO-16405*, Aug. 23, 1957, 29 pp. (UF767 Un3.1id Contin.)

Equations are derived for the formation of a daughter isotope from a parent isotope under constant power operation of a thermal reactor.

11399 Uranium Fission Stoichiometry. F. P. Vance. *U. S. Atomic Energy Commission, IDO-16432*, Jan. 6, 1958, 14 pp. (UF767 Un3.1id Contin.)

Stoichiometric relationships between U-235 fissioned and U-236 produced by the n,γ reaction. Derivation of equations relating burnup and fission product generation.

11400 Heat Generation Within the Thermal Shields and Vessel Wall of the Spert-III Reactor. V. C. Kobold. *U. S. Atomic Energy Commission, IDO-16414*, Mar. 1, 1958, 22 pp. (UF767 Un3.1id Contin.)

Results predict that there will be no excessive thermal stresses within the shields and the vessel shell and that the present SPERT-III thermal shield configuration is an adequate design.

11401 Fallout Studies and Assessment of Radiological Phenomena. L. E. Egeberg. *U. S. Atomic Energy Commission, ITR-1465*, Feb. 28, 1958, 43 pp. (UF767 Un3.1it Contin.)

Studies on the terrain attenuation factor for γ fields; effect of shot towers on the physical, chemical, and radiochemical features of fallout material; prototype instrumentation developed for the collection of countermeasures data.

11402 Health Problems Associated With the Civilian Reactor Program. J. J. Fitzgerald and J. L. Flynn. *U. S. Atomic Energy Commission, KAPL-1804*, Apr. 30, 1957, 35 pp. (UF767 Un3.1ka Contin.)

11403 Electrolytic Recycle Method for the Treatment of Radioactive Nitric Acid Waste. H. W. Alter, et al. *U. S. Atomic Energy Commission, KAPL-1721*, June 26, 1957, 81 pp. (UF767 Un3.1ka Contin.)

Process consists of electrolysis of $NaNO_3$ solutions and recycle of the caustic formed to neutralize incoming HNO_3 waste.

11404 Irradiation Behavior of Dispersion Fuels. D. W. White, A. P. Beard, and A. H. Willis. *U. S. Atomic Energy Commission, KAPL-1909*, Oct. 1, 1957, 56 pp. (UF767 Un3.1ka Contin.)

Extent of property retention in a dispersion fuel alloy is dependent on the materials selected for the fuel-bearing and matrix phases and on their microstructural arrangement in the alloy. Consequences of varying the materials and fuel-phase particle size and volume fraction are discussed.

11405 Safety Tests for the Storage of Fissile Units. E. C. Mallary, H. C. Paxton, and R. H. White. *U. S. Atomic Energy Commission, LA-1875* (Del.) Feb. 1955 (issued Apr. 8, 1958), 39 pp. (UF767 U3La Contin.)

Neutron multiplication measurements on cubic lattices of fissile units inside cubic concrete vaults. Effect of impurities such as blocks of paraffin or the presence of boron plastic within the lattice.

11406 Preliminary Critical Experiments on a Mock-Up of the Los Alamos Molten Plutonium Reactor. H. G. Barkmann, D. M. Holm, R. M. Kiehn, and R. E. Peterson. *U. S. Atomic Energy Commission, LA-2142*, June 1957, 29 pp. (UF767 U3La Contin.)

Mechanical arrangement of the critical experiment; critical masses and control shim effectiveness; fission rate measurements.

11407 Index and Annotated Bibliography of Range and Stopping Cross Section Data. Ronald E. Brown and Nelson Jarmie. *U. S. Atomic Energy Commission, LA-2156*, Feb. 14, 1958, 68 pp. (UF767 U3La Contin.)

Emphasis is on values of the range and stopping cross section of charged particles in matter that would be of use in planning and executing a research project. All common "heavy" particles are included—protons, deuterons, α-particles, heavy ions, and mesons. Survey is complete to May 1957.

11408 Size Resonances in Proton Scattering. Charles E. Porter. *U. S. Atomic Energy Commission, LAMS-2182*, Apr. 21, 1958, 36 pp. (UF767 Un3.1La Contin.)

In the angular distributions of the elastically scattered protons, there is deviation from pure Coulomb scattering considerably below the barrier height.

11409 Organic Moderated Reactor Experiment, Safeguards Summary. H. L. Sletten, editor. *U. S. Atomic Energy Commission, NAA-SR-2323*, Feb. 1, 1958, 139 pp. (UF767 Un3.1na Contin.)

Hazards associated with experiment, and safeguards taken to ensure safety of operating personnel and the population of the surrounding area.

11410 A Radiation Gauge for Inspection of OMRE Fuel Plates. H. Schlein. *U. S. Atomic Energy Commission, NAA-SR-2040*, May 1, 1958, 20 pp. (UF767 Un3.1na Contin.)

Shows that, for the specified application and prescribed method of operation, the equipment will easily detect 2% relative variations of UO_2 concentration.

11411 Digital Rod Position Indicator System. *U. S. Atomic Energy Commission, NYO-8503*, Dec. 2, 1957, 21 pp. (UF767 U3ny Contin.)

Development of an improved rod position indicator which permits the accurate measurement of rod position in applications which preclude direct contact with rod or driving mechanism.

11412 Stray Radiation Measurements at Particle Accelerator Sites. J. E. McLaughlin, Jr., et al. *U. S. Atomic Energy Commission, NYO-4699* (Suppl. 1), Feb. 7, 1958, 76 pp. (UF767 U3ny Contin.)

Measurements at 23 sites are summarized. Conclusions on safe accelerator operation are drawn, as well as general conclusions regarding radiation dosimetry, maximum permissible levels, and instrumentation.

11413 The ORNL Gas-Cooled Reactor, Plant Design. I-IV. *U. S. Atomic Energy Commission, ORNL-2500*. Apr. 1, 1958, sections individually paged. (UF767 U3o Contin.)

Gas-cooled reactor physics; materials; fuel elements; reactor; gas system; instrumentation and controls; operation procedures; steam system; proposed plant design; cost analysis; heat transfer performance; reactor support and charging machine; fuel element cost data; design data for gas-cooled reactor.

11414 On Kofink's Approximate Solution of the Neutron Transport Equation. Kv Fan and J. J. Andrews. *U. S. Atomic Energy Commission, ORNL-2485*, Apr. 10, 1958, 41 pp. (UF767 U3o Contin.)

11415 A Search for Coulomb Fission of U^{238} by 28-Mev Nitrogen Ions. W. H. Jones and A. Zucker. *U. S. Atomic Energy Commission, ORNL-58-3-38*, 4 pp. (UF767 U3o Contin.)

11416 Fuel Elements Conference, Paris, November 18-23, 1957. *U. S. Atomic Energy Commission. TID-7546* (Books I-II), Mar. 1958, 811 pp. (UF767 Un3ti Contin.)

These 33 papers provide an intensive review of fuel-element fabrication practices and behavior of fuel elements under in-pile irradiation and when subjected to corrosive media.

11417 The Dynamics of π-μ Decay in Flight. M. Lynn Stevenson. *U. S. Atomic Energy Commission, UCRL-3481*, July 25, 1956, 9 pp. (UF767 U3u Contin.)

Data are given in graphical form for pion kinetic energies (T_π) from 5 Mev to 100 Mev.

11418 Calibration of the Bevatron Beam-Induction Electrodes. Harry G. Heard. *U. S. Atomic Energy Commission, UCRL-8092*, Jan. 1958, 11 pp. (UF767 U3u Contin.)

11419 Several Spallation Reactions of Uranium-238 Plus Helium^{-4}. Joseph A. Coleman. *U. S. Atomic Energy Commission, UCRL-8186*, Feb. 1958, 32 pp. (UF767 U3u Contin.)

A radiochemical study of the reactions of He ions of energies less than 48 Mev with U^{238} to produce the spallation products U^{237}, U^{239}, Np^{238}, and Pu^{238}.

11420 A Lattice of Slightly Enriched UO_2 Fuel Rods Partly Immersed in Light Water. D. R. Harris. *U. S. Atomic Energy Commission, WAPD-TM-114*, Nov. 1957, 26 pp. (UF767 Un3.1wa Contin.)

Few-group diffusion theory is employed to investigate the interaction between the water-moderated and dry portions of the lattice.

11421 The Response of Elastic Spherical Shells to Spherically Symmetric Internal Blast Loading. Wilfred E. Baker and Frank J. Allen. *U. S. Atomic Energy Commission, WASH-746*, Nov. 1957, 43 pp. (UF767 Un3.1w Contin.)

An analytical study of the reaction of an idealized nuclear reactor containment shell to internal transient loading which could be caused by reactor runaway.

11422* (German.) Dispersion Equations for the Scattering of π-Mesons on Deuterons. **Dispersionsbeziehungen für die Streuung von π-Mesonen an Deuteronen.** F. Kaschluhn. *Zeitschrift für Naturforschung*, v. 13a, no. 3, Mar. 1958, p. 183-194.

Equations derived for the elastic forward-scattering of charged and uncharged π-mesons on deuterons by neglecting the electromagnetic interaction.

11423* (German.) The Distribution of Angle and Energy in Photoprotons From the $A^{40}(\gamma, p)$ Cl^{139} Process. **Winkel- und Energieverteilung der Photoprotonen aus dem Prozess $A^{40}(\gamma, p)$ Cl^{139}.** F. Gudden and J. Eichler. *Zeitschrift für Physik*, v. 150, no. 4, 1958, p. 436-446.

This process was analyzed with the γ-radiation of a 15 m.e.v. betatron.

11424* (German.) Nuclear Resonance Fluorescence of Gamma Radiation in Ir^{191}. **Kernresonanzfluoreszenz von Gammastrahlung in Ir^{191}.** Rudolf L. Mössbauer. *Zeitschrift für Physik*, v. 151, no. 2, 1958, p. 124-143.

Investigation of the nuclear resonance absorption of the 129 k.e.v. γ-rays in Ir resulting from the desintegration of Os^{191}. Measurement of the average effect of the source and the absorber at 90 K $<$ T $<$ 370 K.

11425* (Russian.) Decay Scheme of Ba^{140}. **Skhema raspada Ba^{140}.** A. N. Silant'ev. *Zhurnal Eksperimental'noi i Teoreticheskoi*, v. 34, no. 3, Mar. 1958, p. 569-573.

The γ-ray spectrum of Ba^{140} was measured with a scintillation γ-spectrometer. A decay scheme is proposed.

11426* (Russian.) Measurement of the Absorption Cross-Section for Fast Neutrons. **Izmerenie secheniia pogloshcheniia bystrykh neitronov.** T. S. Belanova. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 34, no. 3, Mar. 1958, p. 574-578.

Cross sections for 25, 220, and 830 k.e.v. photoneutrons are obtained for 20 elements.

See also: **10452** (fuel reprocessing unit); **10470** (new work in fuel processing); **10496** (neutron activation analysis); **10629** (radiation damage); **10638** (isotope separation); **10713** (iodine in an LMFR fuel); **10717** (radiation effects); **10727** (chemistry of atoms from nuclear transformation); **10804** (pumping liquid methods); **10918** (nuclear counting circuits); **10971** (cosmic ray research); **11017** (computers study of a BWR power plant); **11070** (lubricants for nuclear plants); **11107** (materials for atomic power reactors); **11116** (reactor fuel elements); **11118** (reactor fuel elements); **11175** (reactor fuel elements); **11515** (effects of fallout on oceanography and fisheries).

OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING

11427 Automation and Management. James R. Bright. 270 pp. 1958. Plimpton Press, Norwood, Mass. (HD45 B76a Over.)

An analysis of the nature and characteristics of automation, some of its benefits and disadvantages, some of the major effects on business operations, and important implications for business management.

11428 General Design Considerations for Man-Machine Systems. John C. Groce. *IRE Transactions on Instrumentation*, v. I-7, no. 1, Mar. 1958, p. 69-76. (TK1 In6.6i Vis.)

Some techniques for systems evaluation and synthesis which permit consideration of the human as an integral subsystem. The various sensory modalities, their operational processes, capabilities, and limitations are discussed.

11429* Increasing Utilization of the Cost-Quantity Relationship in Manufacturing. Reno R. Cole. *Journal of Industrial Engineering*, v. 9, no. 3, May-June 1958, p. 173-177.

The theory of the above relationship states that as the total quantity of a product or model manufactured for the first time doubles, the direct labor cost of the $2n^{th}$ unit will be less than the direct labor cost of the n^{th} unit by some fixed percentage of the n^{th} unit cost.

11430* System Simulation—A Fundamental Tool for Industrial Engineering. Donald G. Malcolm. *Journal of Industrial Engineering*, v. 9, no. 3, May-June 1958, p. 177-187.

Simulation has the advantage of being easily understood, of being relatively free of mathematics and of often being quite superior to mathematical methods which may be too complex.

ORE AND MATERIALS BENEFICIATION

11431 The Hydrometallurgy of Refractory Canadian Uranium and Columbium Minerals. A. D. Pittuck, C. A. Freitag, and T. V. Lord. *Canadian Mining and Metallurgical Bulletin*, v. 51, no. 552, Apr. 1958, p. 228-233.

Recovery by leaching Cb with HF and U with HNO_3, H_2SO_4, or Na_2CO_3 solutions. The leach liquors were extracted with organic solvents from which the values were stripped and precipitated, producing final products assaying 45 to 55% Cb_2O_5 and 60 to 70% U_3O_8.

11432 Re-Grind Practice at Canadian Exploration Limited. H. A. Steane. *Canadian Mining and Metallurgical Bulletin*, v. 51, no. 552, Apr. 1958, p. 215-218; *Canadian Institute of Mining and Metallurgy, Transactions*, v. 61, 1958, p. 125-128.

Details of the re-grind section in a 2000-ton per day, Pb-Zn flotation mill.

11433 Fine Grinding at Supercritical Speed. R. T. Hukki. *Mining Engineering*, v. 10; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 211, May 1958, p. 581-591.

A wide supercritical speed range will become available for grinding, and especially for fine grinding, if the basic conditions within the mill have been selected properly. Mathematical analysis of mill dynamics at supercritical speeds has indicated that the mill speed may be increased if total mass of grinding medium decreases, mass of the individual grinding piece increases, and the coefficient of friction between the outer layer of medium and the mill lining decreases.

11434* (Russian.) Influence of Controlling Factors on the Interaction of Collecting Agents and Surface of Minerals. **O vliianii reguliatorov na vzaimodeistvie sobiratelei s poverkhnost'iu mineralov.** M. A. Eigeles. *Tsvetnye Metally*, v. 31, no. 3, Mar. 1958, p. 12-19.

Experimental investigation of the effect of sodium oxalate and potassium chromate on the flotation of fluorite and barite by fatty acids and their soaps, and on the fixing of collecting agents to the surface of minerals. Lauric and oleic acids and sodium tridecylate traced by radioactive C-14 are used as collectors.

11435 Evaluation of the "Reverse Strike" Head-End Procedure. David G. Karraker and Sidney G. Parker. *U. S. Atomic Energy Commission, DP-259*, Dec. 1957, 15 pp. (UF767 Un3.1dp Contin.)

"Head-end" scavenging of solutions of irradiated U with precipitated MnO_2 was modified to minimize volatilization of Ru.

See also: **10474** (solvent extraction of Zr); **10715** (dissolution of Al fuel elements); **10980** (concentration of minerals).

PHYSICS

11436 Ultrasonic Dispersion in Oxygen. James V. Connor. *Acoustical Society of America, Journal*, v. 30, Apr. 1958, p. 297-300.

The collision number in O is determined from velocity measurements in the frequency-pressure range from 1 to 400 Mc/atm.

11437 On the Measurement of Ultrasonic Velocity in Solids. J. Williams and J. Lamb. *Acoustical Society of America, Journal*, v. 30, Apr. 1958, p. 308-313.

Technique employs the mutual cancellation of a pair of traveling wave trains.

11438 Elastic Moduli of Single Crystal Germanium as a Function of Hydrostatic Pressure. H. J. McSkimin. *Acoustical Society of America, Journal*, v. 30, Apr. 1958, p. 314-318.

Adiabatic elastic moduli are reported as a function of hydrostatic pressure to 50,000 psi psi, and for a temperature range of 0-75 C.

11439 An Instrument for Recording Changes of Sound Velocity in the Sea. W. D. Chesterman and M. J. Gibson. *Acustica*, v. 8, no. 1, 1958, p. 44-52.

A continuous wave system is transmitted from one transducer to another across a fixed path, and the phase difference is measured between transmitted and received signals.

11440 The Structure of Ice-I, as Determined by X-Ray and Neutron Diffraction Analysis. P. G. Owston. *Advances in Physics*, v. 7, no. 26, Apr. 1958, p. 171-188.

The first of eight papers on physical properties of ice which constitute this issue.

11441* (Russian.) Radiation of Plasma in a Magnetic Field. **Izluchenie plazmy v magnitnom pole.** B. A. Trubnikov. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 5, Feb. 11, 1958, p. 913-916.

Effect of electron rotation on the radiation of plasma.

11442 Recent Advances in Physics. David Park. *American Journal of Physics*, v. 26, no. 4, Apr. 1958, p. 210-234.

A review for the general reader, covering nobelium and the new heavy isotopes, catalysis of nuclear reactions by μ mesons, and the parity question.

11443 Pressure-Volume Relations in Solids. George E. Duvall. *American Journal of Physics*, v. 26, no. 4, Apr. 1958, p. 235-238.

An equation of state of the form $P(V)=f(V)+Tg(V)$, which is useful for condensed matter, is proposed for the illustration of thermodynamic principles. Pressure-volume relations for adiabatic and shock compressions are derived.

11444 On the Classical Mechanics of the Internal Rotation of Molecules. Chun C. Lin. *American Journal of Physics*, v. 26, no. 5, May 1958, p. 319-323.

The classical solution is given for a symmetric rotor which in addition to the three degrees of freedom corresponding to the over-all rotation has also a degree of freedom for internal rotation about the axis of symmetry.

11445* Motion of Magnetic Lines of Force. William A. Newcomb. *Annals of Physics*, v. 3, Apr. 1958, p. 347-385.

Shows that a family of surfaces exists if and only if $\mathbf{E}\cdot\mathbf{H}$ vanishes identically, in which case they will be generated by lines of force moving with the particle drift velocity v_p.

11446* Light Scattering by Nearly Perfect Crystals. O. Theimer and C. A. Plint. *Annals of Physics*, v. 3, Apr. 1958, p. 408-422.

Above is developed in a form adapted to modern theories of lattice imperfections.

11447* (English.) **On the L_1 X-Ray Absorption Spectrum of Metallic and Vitreous Selenium and of Selenium Dioxide.** L. Rudström and S. Sjöberg. *Arkiv för Fysik*, v. 13, no. 4, 1958, p. 297-302.

11448 The Third Law of Thermodynamics: A Half-Century Appraisal of the Nernst Heat Theorem. J. H. Potter. *ASME, Transactions*, v. 80, no. 4, May 1958, p. 895-903.

The several statements of the theorem are examined in the light of classical thermodynamics, quantum considerations, and recent low-temperature experiments. The limitations under which the heat theorem may be considered a basic scientific law are cited.

11449* Classical Electrodynamics as a Distribution Theory. II. J. G. Taylor. *Cambridge Philosophical Society, Proceedings*, v. 54, pt. 2, Apr. 1958, p. 258-264.

Defines the energy and momentum of the field lying in a space-like surface and shows that from this four-vector the usual equation of conservation of total energy and momentum can be derived.

11450 Absorption in a Dielectric Slab. M. P. Bachynski. *Canadian Journal of Physics*, v. 36, Apr. 1958, p. 456-461.

The amount of incident energy transmitted, reflected and absorbed by a parallel slab of lossy, high-dielectric-constant material is derived.

11451 Crystal Orientation in Ice Sheets. F. G. J. Perey and E. R. Pounder. *Canadian Journal of Physics*, v. 36, Apr. 1958, p. 494-502 + 2 plates

Crystal size and orientation in ice sheets frozen under one-dimensional cooling from melts of pure water or melts containing traces of organic additives were studied using a universal stage polariscope.

11452* (French.) Identifying the Luminescent Complexes of Cadmium Iodide and Lead Iodide. **Gabriel Monod-Herzen and Nguyen Chung-Tu.** *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 15, Apr. 14, 1958, p. 2247-2250.

Volumetric determination between 15 and 65 C of the solubility of I_2Pb in I_2Cd solutions of different concentrations. Curves show results.

11453* (English.) **On the Theory of the Coercive Field of Single-Domain Crystals of $BaTiO_3$.** Václav Janovec. *Czechoslovak Journal of Physics*, v. 8, no. 1, 1958, p. 3-16.

The coercive field E_c is defined as an electric field on the attainment of which the probability of producing anti-parallel nuclei begins to rise extremely rapidly. A theory of the coercive field is given which explains the dependence of E_c on the thickness of the crystal and leads to values which agree with experiment in order of magnitude.

11454* (English.) **The Mean Free Path and Mobility of Electrons in Ionic Crystals.** Lubomír Hrivnák. *Czechoslovak Journal of Physics*, v. 8, no. 1, 1958, p. 57-65.

Relations are found for the mean free path and mobility of an electron or hole in ionic crystals. The results are compared with experiment.

11455* (German.) Effect of Temperature on Photoluminescence of ZnS and CdS Activated With Silver. **Die temperaturabhängigkeit der Photolumineszenz der Silberaktivierten Zink-Kadmium-Sulfide.** Ivan Soudek. *Czechoslovak Journal of Physics*, v. 8, no. 1, 1958, p. 66-80.

Investigation of relationship between intensity of luminescence and temperature during heating and cooling, at various rates of temperature changes, in various regions of the emission spectrum, and on specimens of various compositions. At room temperature the luminescences studied showed a simple spectral curve with one maximum.

11456 Electricity and Magnetism. B. I. Bleaney and B. Bleaney. 676 pp. 1957. Oxford University Press, London. (QC518 B61e)

Principles and experimental aspects of electricity and magnetism, together with an elementary account of the underlying atomic theory.

11457* Infrared and Raman Spectra of Witherite ($BaCO_3$) and Strontianite ($SrCO_3$). P. S. Narayanan and B. R. Lakshmanan. *Indian Institute of Science, Journal*, v. 40, sec. A, no. 1, Jan. 1958, p. 1-11 + 1 plate.

11458 Elastic Constants by the Ultrasonic Pulse Echo Method. S. Eros and J. R. Reitz. *Journal of Applied Physics*, v. 29, Apr. 1958, p. 683-686.

Elastic constants of single-crystal KCl and NaI were measured by means of the ultrasonic pulse echo method using a wide-band amplifier to display the *unrectified* echo pattern directly.

11459 Energy Distribution Half-Widths for Field Emission Electrons. E. L. Murphy. *Journal of Applied Physics*, v. 29, May 1958, p. 758-759.

For the distributions, the width of the peak at half maximum and the partial widths from peak to half-maximum on either side are presented graphically as a function of one parameter depending on temperature, field, and work function.

11460 Photoconductivity of Anthracene. IV. Bulk Photoconduction in Single Crystals. V. Effect of Imperfection on the Bulk Photocurrent. J. Kommandeur and W. G. Schneider. *Journal of Chemical Physics*, v. 28, Apr. 1958, p. 582-595.

11461 Thermionic Emission of Thoriated Tungsten. Petr Schneider. *Journal of Chemical Physics*, v. 28, Apr. 1958, p. 675-682.

Methods were developed for quantitative chemical analysis of those constituents of thoriated W filaments, both uncarbonized and carbonized, which are significant for thermionic emission. Composition of each filament is correlated with both thermionic performance and method of preparation.

11462* Some Applications of X-Ray Crystallography to Geologic Thermometry. Alfred J. Frueh, Jr. *Journal of Geology*, v. 66, no. 2, Mar. 1958, p. 218-223 + 3 plates.

The presence of domains can be detected by X-ray diffraction and can be used as an indication of the previous temperature history of the mineral.

11463* (French.) Measurements of the Variation of the Coercive Force as a Function of the Angle in Evaporated Nickel Layers. **Mesures sur la variation du champ coercitif en fonction de l'angle dans des couches en nickel condensées dans le vide.** A. Van Itterbeek and A. Dupré. *Journal de Physique et le Radium*, v. 19, no. 2, Feb. 1958, p. 113-118.

Magnetoresistance measurement. Description of the evaporation apparatus. Determination of layer thickness by an optical method. Effect of the direction of the force. Variation of the coercive force in a longitudinal field.

11464 Mass Spectroscopy. Henry E. Duckworth. 206 pp. 1958. Cambridge University Press, London. (QC451 D85m)

Principles governing the operation of mass spectroscopes, including the methods devised to obtain mass resolutions and dispersion and those for the production and detection of ion beams. Applications in physics, geophysics, chemical physics, and related sciences.

11465 The Measurement of Colour. W. D. Wright. 2nd Ed. 263 pp. 1958. Macmillan Co., New York. (QC495 W93m2)

Principles, methods, and applications of the fundamental trichromatic system of color measurement.

11466* Time-Dependent Principles of Invariance. Rudolph W. Preisendorfer. *National Academy of Sciences, Proceedings*, v. 44, Apr. 1958, p. 328-332.

Radiative-transfer phenomena are classified according to the relative importance of the roles played by the three general processes of conduction, convection, and radiation.

11467 An Experiment on the Interaction Between a Plane Shock and a Magnetic Field. K. Dolder and R. Hide. *Nature*, v. 181, Apr. 19, 1958, p. 1116-1118.

Experiment has two essential features: gas flow is so rapid that dynamical effects of compressibility are present; system has axial symmetry.

11468* (English.) **Analytical Theory of the Behaviour of Ferromagnetic Materials.** G. Biorci and D. Pescetti. *Nuovo Cimento*, v. 7, ser. 10, no. 6, Mar. 16, 1958, p. 829-842.

It is shown that every transformation in the *J-H* plane of a ferromagnetic specimen can be computed from the magnetization curve and saturation loop of the material. This is based on the assumption that each volume element is characterized by a rectangular loop of sides a and b (Preisach model).

11469 Single Particle Scattering Functions for Latex Spheres in Water. Louis E. Ashley and Carolus M. Cobb. *Optical Society of America, Journal*, v. 48, Apr. 1958, p. 261-268.

The angular distribution of intensity of light scattered by spherical particles was computed for values of α (a size parameter= circumference of the particle divided by the wavelength of the incident beam) equal to 1.0, 2.0, 3.0, 5.0, 8.0, 10, 15, 20, 30, and 35.

11470 The Magnetic Susceptibility and Electrical Resistivity of Some Transition Metal Silicides. D. A. Robins. *Philosophical Magazine*, v. 3, no. 28, Apr. 1958, p. 313-327.

These silicides are essentially metallic in character.

11471 (English.) **On the Ground State of Superconductors.** C. G. Kuper. *Physica*, v. 24, no. 4, Apr. 1958, p. 304-312.

The role of the Coulomb repulsion is discussed in some detail. The results do not differ qualitatively from those of Bardeen, Cooper, and Schrieffer.

11472 Dissociative Attachment of Electrons in Iodine. I. Microwave Determination of the Absolute Cross Section at 300° K. Manfred A. Biondi. **II. Mass Spectrographic Determination of the Energy Dependence of the Cross Section.** R. E. Fox. **III. Discussion.** Manfred A. Biondi and R. E. Fox. *Physical Review*, v. 109, ser. 2, no. 6, Mar. 15, 1958, p. 2005-2014.

11473* (English.) **Some Studies on the Ternary System $(Ba\text{-}Pb\text{-}Ca)TiO_3$.** Takuro Ikeda. *Physical Society of Japan, Journal*, v. 13, Apr. 1958, p. 335-340.

Phase relations and dielectric and mechanical properties.

11474 An Experimental Study of Pulse Propagation in Elastic Cylinders. D. Y. Hsieh and H. Kolsky. *Physical Society, Proceedings*, v. 71, Apr. 1958, p. 608-612.

The distortion of longitudinal pulses in elastic cylinders resulting from the effects of lateral inertia is discussed in terms of the Pochhammer treatment.

11475 Theory of Infra-Red Resonances in Ferrimagnetics. Ernst Schlömann. *Physics and Chemistry of Solids*, v. 2, no. 3, 1957, p. 214-220.

11476 A Thermodynamic Theory of "Weak" Ferromagnetism of Antiferromagnetics. I. Dzyaloshinsky. *Physics and Chemistry of Solids*, v. 4, no. 4, 1958, p. 241-255.

Alpha iron (III) oxide, $MnCO_3$, and $CoCO_3$ are studied.

11477 A Ferromagnetic Dynamical Equation. Herbert B. Callen. *Physics and Chemistry of Solids*, v. 4, no. 4, 1958, p. 256-270.

Based on general considerations concerning the dissipative mechanism, this equation contains three parameters, which have definite quantum-mechanical significance.

11478 Optical Properties of Semiconductors Under Hydrostatic Pressure. I. Germanium. II. Silicon. William Paul and D. M. Warschauer. *Physics and Chemistry of Solids*, v. 5, nos. 1/2, 1958, p. 89-106.

11479 Kinetic Theory of Moderately Dense Gases. R. F. Snider and C. F. Curtiss. *Physics of Fluids*, v. 1, no. 2, Mar.-Apr. 1958, p. 123-138.

Based on a modified Boltzmann equation, which takes into account the "collisional transfer" of momentum and energy.

11480* Nuclear Magnetic Relaxation in Liquid Hydrogen. Tôru Moriya. *Progress of Theoretical Physics*, v. 18, no .6, Dec. 1957, p. 567-572.

A theory of nuclear relaxation time in solid H_2 is extended to the liquid case. The distinctive feature is the diffusional motion of the molecules which modulates the anisotropic intermolecular forces.

11481* Effect of Electron Exchange on the Dispersion Relation of Plasma Oscillations. Hideo Kanazawa and Shoichio Tani. *Progress of Theoretical Physics,* v. 19, no. 2, Feb. 1958, p. 153-158.

A dispersion relation is derived and compared with experimental data.

11482* The Mobilities of Ions in Unlike Gases. A. Dalgarno, M. R. C. McDowell, and A. Williams. *Royal Society of London, Philosophical Transactions,* v. 250, Ser. A, Mathematical & Physical Sciences, no. 982, Apr. 17, 1958, p. 411-439.

Available data on mobilities at low field strengths are analyzed on the basis of a simple theoretical description.

11483 Gravitational Waves in General Relativity. I. Cylindrical Waves. L. Marder. *Royal Society, Proceedings,* v. 244, ser. A, Apr. 22, 1958, p. 524-537 .

Shows that the waves propagate energy.

11484 Selected Topics in Low Energy Pion Physics. Lectures Given at Purdue University. Michael J. Moravcsik. *U. S. Atomic Energy Commission,* BNL-459 (T-100), Mar. 1957, 27 pp. (UF767 Un3.1bn Contin.)

A lecture.

11485 The Evaluation of the Kassel Integral via IBM 704. Eugene M. Willbanks. *U. S. Atomic Energy Commission, LA-*2178, Jan. 1958, 61 pp. (UF767 U3La Contin.)

A high-speed electronic computer was used to perform numerical integrations of the Kassel integral.

11486 The Infrared Spectra of HMX and RDX. Ann Werbin. *U. S. Atomic Energy Commission, UCRL-*5078, Dec. 31, 1957, 8 pp. (UF767 U3u Contin.)

Infrared data for the β crystalline form of cyclotetramethylene tetranitramine and the α form of cyclotrimethylene trinitramine.

11487* (German.) The Passage of Gases Through Plastic Foils. **Über den Durchgang von Gasen durch Kunststoffolien.** H. Klumb and R. Dauscher. *Vakuum-Technik,* v. 7, nos. 2/3, Apr. 1958, p. 35-41.

The gas permeability of three high-polymer plastic foils was investigated, and the constants of permeation and diffusion for H, He, O, and N, with reference to these foils, were determined.

11488* (German.) A New Method for the Production of Plasma for Ion Sources. **Eine neue Methode zur Plasmaerzeugung für Ionenquellen.** A. Ziegler. *Zeitschrift für Angewandte Physik,* v. 10, no. 4, Apr. 1958, p. 185-186.

An attempt was made to feed a highly ionized plasma into the vacuum through a small opening.

11489* (German.) The Spectroscopy in Far-Infrared Through Interference Modulation. **Spektroskopie im fernen Ultrarot durch Interferenz-Modulation.** Ludwig Genzel and Reinhart Weber. *Zeitschrift für Angewandte Physik,* v. 10, no. 4, Apr. 1958, p. 195-199.

It was proved experimentally that interference modulation reacts energetically more favorably than does the lattice dispersion, and additional filters are no longer required.

11490* (German.) The "Memory" Effect in the Intensification of Luminescence by Electric Fields. **Der Gedächtniseffekt bei der Verstarkung der Lumineszenz durch elektrische Felder.** Georges Destriau. *Zeitschrift für Physik,* v. 150, no. 4, 1958, p. 447-455.

According to the newly discovered "memory effect", it is possible to sensitize a fluorescent material through a simultaneous action of an electric field and of weak X-ray radiation.

11491* (German.) Static Effects of the Artificial Radioactivity. **Luftelektrische Wirkungen der künstlichen Radioaktivität.** H. Israël. *Zeitschrift für Physik,* v. 151, no. 1, 1958, p. 35-45.

Comparison of the ionizing effect of the fission products with that of the natural ionization in the atmosphere. No change has taken place yet in the static conditions. Effects on the static field near the ground and on the atmospheric conductivity, especially in the case of "fall out" are possible.

11492* (English.) **Calculation of Fields on Plasma Ions by Collective Coordinates.** A. A. Broyles. *Zeitschrift für Physik,* v. 151, no. 2, 1958, p. 187-201.

The probability of finding a given electric field on an ion in a plasma is computed with the aid of the collective coordinates. All the ions are assumed to have the same charge, and the free electrons are replaced by a rigid negative smear. The Jacobian of the transformation to collective coordinates is expanded in a series of Hermite polynomials, and one of the higher terms is computed as an estimate of the error.

11493* (Russian.) Certain Characteristics of the Photoconductivity in Cadmium Selenide. **K voprosu ob osobennostiakh fotoprovodimosti v selenide kadmiia.** S. V. Svechnikov. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* v. 34, no. 3, Mar. 1958, p. 548-554.

Special features of the photoconductivity in CdSe monocrystals are viewed under red-light excitement with λ=7740 Å and X-rays.

11494* (Russian.) Electron Loss and Capture in Collisions Between Fast Hydrogen Atoms and Molecules of Gases. **Zakhvat i poteria elektrona pri stolknoveniiakh bystrykh atomov vodoroda s molekulami gazov.** Ia. M. Fogel', V. A. Ankudinov, D. V. Pilipenko, and N. V. Topolia. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* v. 34, no. 3, Mar. 1958, p. 579-592.

See also: **10719** (thermal stabilities of hydrous aluminum oxides); **10725** (thermodynamic properties of air); **10959** (effect of magnetic field on flow of Hg); **11053** (double-beam infrared microspectromter); **11252** (optical properties of metals in infrared region).

PLASTICS

11495* (Russian.) Kinetics of Isobutylene Polymerization in the Presence of Boron Fluoride Etherate. **Kinetika polimerizatsii izobutilena v prisutstvii efirata ftoristogo bora.** M. I. Vinnik, G. B. Manelis, G. V. Epple, and N. M. Chirkov. *Akademiia Nauk SSSR, Doklady,* v. 119, no. 1, Mar. 1, 1958, p. 98-100.

11496* (Russian.) Polymerization and Copolymerization of Unsaturated Organo-Silicon Compounds. The *p*-Trialkylsilylstyrenes. **Polimerizatsiia i sopolimerizatsiia nepredel'nykh kremniiorganicheskikh soedinnenii. *p*-Trialkilsililstiroly.** V. V. Korshak, et al. *Akademiia Nauk SSSR, Doklady,* v. 119, no. 2, Mar. 11, 1958, p. 282-284.

11497* (Russian.) Studies in the Field of Heterogenous Chain Polyamides. **Iz oblasti geterotsepnykh poliamidov. VIII.** On the Solubility of Copolyamides. **O rastvorimosti smeshannykh poliamidov.** T. M. Frunze and V. V. Korshak. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk,* 1958, no. 3, Mar., p. 344-352.

Relationship between the solubility and composition of copolyamides of different structures. Increase of this solubility in comparison with homogeneous polyamides. Effect of polyamide composition on melting temperature.

11498* (Russian.) Dielectric Losses and Polarization of Polymers. **Dielektricheskie poteri i poliarizatsiia polimerov.** G. P. Mikhailov and A. M. Lobanov. *Akademiia Nauk SSSR, Seriia Fizicheskaia,* v. 22, no. 3, Mar. 1958, p. 323.

11499 The Photoelastic Behaviour of Cross-Linked Polymers. Z. Tuzi, K. Kawata, and I. Hori. *British Journal of Applied Physics,* v. 9, May 1958, p. 173-178.

Properties of polymers were studied over a wide range of temperature. A large change of the stress-optical coefficient was observed in the second order transition region. At temperatures above that region, suitably cross-linked divinyl-benzene polymers show a photoelastic behavior corresponding to nearly perfect entropy-elasticity.

11500* (German.) Ultrasonic Polymerization of Acrylonitrile. **Über die Ultraschallpolymerisation von Acrylnitril. I.** Polymerization in Aqueous and Sulfuric Media. **Polymerisation im wässrigen und schwefelsauren Medium.** Kurt Edelmann and Rosemarie Klemmt. *Faserforschung und Textiltechnik,* v. 9, no. 2, Feb. 1958, p. 49-55.

Aqueous solutions of acrylonitrile polymerize in an ultrasonic field owing to the generation of OH-radicals. Addition of H_2SO_4 to acrylonitrile in dimethylformamide followed by ultrasonic treatment results in intensive polymerization.

11501* (German.) Comparative Examination of the Polycaproamides, Obtainable From ε-Caprolactams by the Action of Various Amino-Salts. **Vergleichende Untersuchungen der aus ε-Caprolactam unter Einwirkung verschiedener Aminosalze erhältlichen Polycaproamide.** Wladimir Dawydoff. *Faserforschung und Textiltechnik*, v. 9, no. 2, Feb. 1958, p. 61-67.

Relative viscosity in concentrated H_2SO_4; elongation and tensile strength of silvers. Influence of the dehydration within the initiator.

11502* (German.) Investigations of the Reactions of Styrol With Unsaturated Fatty Acids. **Untersuchungen über die Reaktion von Styrol mit ungesättigten Fettsäuren.** E. Oelsner and K. Hamann. *Fette, Seifen, Anstrichmittel*, v. 60, no. 3, Mar. 1958, p. 189-197.

Polymerization of styrol in phthalic acid dimethyl ester at various temperatures of reaction. Separation of the products of styrol polymerization. Formation of oligostyrol and polystyrol. Products of styrol formation in oleic acid.

11503 A Guide to Plastics. C. A. Redfarn. 2nd Ed. 150 pp. 1958. Philosophical Library, New York. (TP986 R24g2)

Covers the whole field of plastics and includes the basic and intermediate raw materials employed, manufacturing processes; fabrication and properties of plastics materials.

11504* (French.) Polymers and Ultrasonics. **Polymères et Ultrasons.** G. Delzenne. *Industrie Chimique Belge*, v. 23, no. 3, Mar. 1958, p. 217-226.

Theories of degradation of vinyl polymers by ultrasonics. Polymerization of vinyl monomers with ultrasonics compared with γ-ray polymerization. Copolymers of the block-type. Double grafting reactions by means of cross-linking of radical chains.

11505* A Study of Chain Transfer in Homologous Vinyl Esters. Alio J. Buselli, Martin K. Lindemann, and Charles E. Blades. *Journal of Polymer Science*, v. 28, Apr. 1958, p. 485-498.

Shows that the degree of branching in polyvinyl esters increases with an increasing number of carbon atoms in the vinyl ester.

11506* Degradation of Addition Polymers by Ultrasonic Waves. III. Experimental. M. A. K. Mostafa. *Journal of Polymer Science*, v. 28, Apr. 1958, p. 499-536.

11507* Polymerization of *p*-Isopropenylstyrene. P. Dreyfuss and N. T. Notley. *Journal of Polymer Science*, v. 28, Apr. 1958, p. 611-613.

Polymerization characteristics are essentially the same as those of divinylbenzene.

11508* Thermal Degradation of Cellulosic Materials. S. L. Madorsky, V. E. Hart, and S. Straus. *Journal of Research, National Bureau of Standards*, v. 60, no. 4, Apr. 1958, p. 343-349.

Fortisan, cellulose triacetate, and NO_2-oxidized cellulose were pyrolyzed in a vacuum from 180 to 465 C.

11509* (Russian.) Continuous Water-Emulsifying Polymerization of Styrene. **Nepreryvnaia vodnoemul'sionnaia polimerizatsiia stirola.** S. M. Arbitman and A. N. Levin. *Khimicheskaia Promyshlennost'*, 1958, no. 2, Mar., p. 91-96.

11510 Epoxy Foams. D. D. Scott. *Machine Design*, v. 30, June 12, 1958, p. 127-219.

Epoxy foam, although one of the newest of the thermosetting plastic foams, has already found use in many applications which require its particular combination of physical, chemical, and electrical properties.

11511* (French.) Theoretical and Experimental Studies of the Molecular Structure of "High Pressure" Polyethylenes. **Études théoriques et expérimentales sur la structure moléculaire des polyéthylènes "haute pression".** Louis Nicolas. *Mémorial des Services Chimiques de l'État*, v. 41, no. 1, 1956-1957, p. 7-66.

Characteristics of the theoretical distribution of the molecular masses and of the ramifications resulting from kinetic calculations of polymerization. Experimental study of these characteristics on commercial polyethylene samples.

11512* (Dutch.) The Practical Value of Measurements of Plastics. **De praktijkwaarde van metingen aan kunststoffen.** F. M. Jacobs. *Plastica*, v. 11, no. 5, May 1958, p. 332-336.

Measurements of test specimens and plastic articles in dyeworks. Standardizing the measuring methods.

11513* (German.) Weldable Synthetic Materials. **Schweissbare Kunststoffe.** R. Reichherzer. *Schweisstechnik*, v. 12, no. 2, Feb. 1958, p. 13-15.

Definition of weldability in plastics. Molding batches and semi-prepared materials to manufacture tubing, machine members and different types of lining. Weldable and heat sealable laminated packing materials.

11514* (German.) Hot Gas Welding of Hard and Soft Polyvinyl Chloride. **Heissgasschweissung von Hart- und Weich-Polyvinylchlorid.** H. Peukert. *Schweisstechnik*, v. 12, no. 2, Feb. 1958, p. 19-23.

Possibility of hard PVC welding with and without softener-containing welding rods. Better thermal and chemical stability when softeners are used. Higher temperatures than before were used with satisfactory welding results.

11515* (German.) The Viscous Flow of Fluid Ethylene Polymers. **Zum viskosen Fliessen flüssiger Polymerisate des Äthylens.** G. Geiseler. *Zeitschrift für Physikalische Chemie (Leipzig)*, v. 208, nos. 1/2, Dec. 1957, p. 64-77.

Dependence of the viscosity of technical ethylene polymers on temperature and mol. wt. Mechanism of the viscous flow in light of the Eyring theory.

11516* (Russian.) Orientation Studies on High Polymers. **Issledovanie orientatsii v vysokopolimerakh. IV.** The Effect of the Cooling Rate in the Vitrification Temperature Zone on the Sorption Capacity of Polymer Glasses. **Vliianie skorosti okhlazhdeniia v intervale temperatury steklovaniia na plotnost' upakovki polimernykh stekol.** V. A. Kargin and Iu. S. Lipatov. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 2, Feb. 1958, p. 326-331.

11517* (Russian.) The Formation of Free Macroradicals on the Mechanical Breakdown of Polymers. **Ob obrazovanii svobodnykh makroradikalov pri mekhanicheskoi destruktsii polimerov.** N. K. Baramboim. *Zhurnal Fizicheskoĭ Khimii*, v. 32, no. 4, Apr. 1958, p. 806-810.

The formation was established. On forming, the free radicals react with substances of the medium to yield the corresponding derivatives. The mechanical breakdown of mixed polymers lead to their copolymerization.

11518* (Russian.) Catalytic Polymerization of Polyphenyl- and Poly(dimethylphenyl) Siloxanes. **Kataliticheskaia polimerizatsiia polifenil- i poli(dimetilfenil)siloksanov.** K. Andrianov, S. Dzhenchel'skaia, and Iu. Petrashko. *Zhurnal Obshchei Khimii*, v. 28, no. 3, Mar. 1958, p. 685-689.

11519* (Russian.) Effect of Iron Salts on the Reaction Kinetics of Polyethylenepolyamines With Hydroperoxides, and Application of This Reaction in Initiating Polymerization. **Vlianie solei zheleza na kinetiku xzaimodeistviia polietilenpoliaminov s gidroperekisiami i ispol'zovanie etoi reaktsii dlia initsiirovaniia polimerizatsii.** B. A. Dolgoplosk and D. Sh. Korotkina. *Zhurnal Prikladnoi Khimii*, v. 31, no. 4, Apr. 1958, p. 625-630.

11520* (Russian.) Effect of Plasticizers on the Properties of Polyvinyl Chloride. **O zakonomernostiakh vliianiia plastifikatorov na svoistva polivinilkhlorida.** Sh. L. Lel'chuk and V. I. Sedlis. *Zhurnal Prikladnoi Khimii*, v. 31, no. 5, May 1958, p. 790-799.

11521* (Russian.) Diffusion and Viscosity of Solutions of Polymethylmethacrylate and Polyparatertiary Butylphenylmethacrylate. **Diffuziia i viazkost' rastvorov polimetilmetakrilata i poliparatretichnogo butilfenilmetakrilata.** V. N. Tsvetkov and S. I. Klenin. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 5, May 1958, p. 1019-1028.

See also: **10688** ("living polymers"); **10763** (paraffin accumulation in plastic and coated pipes); **10764** (dichlorination of PVC); **10863** (plastics foam for electronic equipment); **10992** (nylon printing plates); **11071** (calender bearing lubrication); **11084** (properties of nylon tubing); **11173** (plastics in the foundry).

POLLUTION AND WASTES

11522* Wet Dust-Collection Equipment. Elbridge M. Smith. *Cost Engineering*, v. 3, no. 2, Apr. 1958, p. 49-54.

Means for selecting the equipment for optimum efficiency.

11523 The Effects of Atomic Radiation on Oceanography and Fisheries. 137 pp. 1957. National Academy of Sciences, Washington, D. C. (QH652 N21.2e)

Physical and chemical properties of wastes produced by atomic power industry. Transport and dispersal of radioactive elements in the sea. Effects of radiation on aquatic organisms.

11524* Radioactive Particles in the Atmosphere at Cincinnati, Ohio. R. Louis Bradshaw and Lloyd R. Setter. *Public Health Reports*, v. 73, May 1958, p. 431-438.

Indicates that most atmospheric particles likely to reach the lungs had a radioactivity of less than 5$\mu\mu$c.

11525* Total Oxidation Treatment of Organic Wastes. John A. Tapleshay. *Sewage and Industrial Wastes*, v. 30, May 1958, p. 652-661.

This inexpensive process accomplishes BOD reductions of 75 to 90%. An effluent BOD of less than 20 ppm is consistently obtained when treating normal domestic sewage.

11526* Underground Waste Disposal. William B. Black. *Sewage and Industrial Wastes*, v. 30, May 1958, p. 669-672.

Indicates that underground disposal of industrial wastes can be a practical method which should be given serious consideration.

11527* Oxygen Demand of the Lower Fatty Acids. P. E. Gaffney and H. Heukelekian. *Sewage and Industrial Wastes*, v. 30, May 1958, p. 673-679.

Consistent BOD values for seven of the lower fatty acids were obtained. The authors list these values and discuss the control of factors necessary to standardize O uptake.

11528 Summary List of Research Projects—Air Pollution. Sections individually paged. 1957. U. S. Public Health Service, Bureau of State Services, Washington, D. C. (TD884 Un3.67s Over.)

A compilation of project descriptions.

See also: **10448** (nuclear wastes); **11397** (radioactive liquid waste disposal); **11401** (radioactive fallout); **11403** (treatment of radioactive HNO_3 wastes); **11412** (stray radiation at accelerator sites).

RUBBER AND ELASTOMERS

11529* (Russian.) Vinyl-Containing Silicone-Natural Rubber Mixtures. **Vinilsoderzhashchii kremniiorganicheskii kauchuk.** S. N. Borisov and I. K. Stavitskii. *Kauchuk i Rezina*, v. 17, no. 2, Feb. 1958, p. 1-5.

Synthesis of nonomers and "vinylsilostomers" and vulcanization of the latter. Combination of the "vinylsilastomers" with natural rubbers. Mixing and vulcanization of methylvinylsiloxene and natural rubbers. These mixtures are more resistant to heat, weather, frost, oil, ozone, and corona discharge than natural rubbers, keep elasticity in a temperature range from −60 to + 200 C, and possess reduced shrinkage.

11530* (Russian.) Effect of Molecular Weight Value of Polymers on Certain Physico-Mechanical Properties of Their Vulcanized Rubbers. **Vliianie velichiny molekuliarnogo vesa polimerov na nekotorye fiziko-mekhanicheskie svoistva ikh vulkanizatov.** I. Ia. Poddubnyi, V. N. Reikh, E. I. Starovoitova, and V. G. Nazarov. *Kauchuk i Rezina*, v. 17, no. 2, Feb. 1958, p. 6-11.

Investigation of the relationship between strength characteristics and elasticity of vulcanized rubbers and molecular weight of initial polymers for a series of domestic divinyl and divinylstyrene rubbers obtained in various conditions.

11531* (Russian.) Molecular Structure of Synthetic Rubbers. **Molekuliarnaia struktura sinteticheskikh kauchukov.** I. Ia. Poddubnyi. *Khimicheskaia Promyshlennost'*, 1958, no. 2, Mar., p. 65-73.

11532* (Russian.) A Special Machine for the Working of Rubber by Milling. **Stanok dlia obrabotki reziny sposobom frezerovaniia.** S. T. Kupriianov. *Stanki i Instrument*, v. 24, no. 4, Apr. 1958, p. 36.

11533* Friction and Abrasion of Rubber. A. Schallamach. *Wear*, v. 1, no. 5, Apr. 1958, p. 384-417.

Experimental evidence is adduced for the view that rubber friction is similar in character to viscous flow and therefore, in contrast to solid friction, not necessarily accompanied by abrasion. This theory implies that the forces of rubber friction are proportional to the true area of contact. The true area of contact is determined by elastic deformation of the asperities on the rubber surface, with the result that Amontons' law is not obeyed by rubber. The laws of rubber friction are deduced from simple models and satisfactorily confirmed by experiment.

See also: **10819** (epoxide resins); **11554** (neoprene in paper).

SPACE HEATING AND CONDITIONING

11534* Air Conditioning an IBM Electronic Data Processing Center. J. C. Stancl and C. A. Riley. *Air Conditioning, Heating, and Ventilating*, v. 55, June 1958, p. 63-65.

Lists the heat load for each of the electronic units and what was done to cut down the heat load in one installation.

11535* Central Heating in the USSR. I. F. Livtchak. *Air Conditioning, Heating, and Ventilating*, v. 55, June 1958, p. 66-70.

Briefly describes climatic conditions in the USSR and discusses one-pipe hot water heating systems, prefabricated pipe and tube assemblies, and shop-fabricated radiant panels built into walls. (To be continued.)

11536* Model Studies of Flue Design. *Air Conditioning, Heating, and Ventilating*, v. 55, June 1958, p. 74-76.

These studies save money for industry through decrease in pressure drop, lower construction costs, and increased precipitator capacity.

11537* Evaporative Cooling Safeguards Potatoes in Storage. R. S. Ash. *Air Conditioning, Heating, and Ventilating*, v. 55, June 1958, p. 79-82.

A structure designed to maintain 40 to 45 F through winter and spring by using natural processes.

11538* Controlling Ventilation Noises. *Air Conditioning, Heating, and Ventilating*, v. 55, June 1958, p. 83-94.

How to predict and reduce fan noise.

11539 High Capacity Low Temperature Refrigeration. J. R. Harnish and N. E. Hopkins. *Chemical Engineering Progress*, v. 54, Apr. 1958, p. 82-86.

Design characteristics of a custom-built refrigeration unit which operates under widely varying temperatures and cooling capacity requirements. A cascade refrigerant system is used.

11540* What You Should Know About Duct Insulation. H. M. Grant. *Heating & Air Conditioning Contractor*, v. 49, no. 9, June 1958, p. 56-59.

Covers the selection and application of duct insulation for residential and small commercial systems.

11541* Thermoelectric Refrigeration. R. L. Eichhorn. *Refrigerating Engineering*, v. 66, June 1958, p. 31-35.

Deals mathematically with the Peltier effect. (To be continued.)

11542* Refrigeration Requirements for Future Air Force Weapons. J. S. Bleymaier. *Refrigerating Engineering*, v. 66, June 1958, p. 36 + 6 pages.

Flight capability beyond Mach 4 within the earth's atmosphere demands cooling. Problems in this field are discussed.

See also: **10518** (refrigeration sludge analysis); **10885** (cooling of airborne electronic equipment); **10886** (cooling of airborne electronic equipment); **11067** (wear in refrigeration compressor).

TEXTILES, FIBERS, LEATHER, AND PAPER

11543* Biological Factors Influencing the Effectiveness of Wood Preservatives Against Decay. C. Hartley. *Applied Microbiology*, v. 6, no. 3, May 1958, p. 207-211.

11544 Fibre Microscopy. Its Technique and Application. J. L. Stoves. 286 pp. 1957. National Trade Press, London. (TS1449 St76f)

Describes the use of the compound microscope and the methods of preparing fibers for microscopic examination; gives an account of the more advanced techniques of modern microscopy and their application to the study of fibers; indicates examples of the technical applications of fiber microscopy in industrial practice.

11545* The Separation and Properties of Hemicellulose, Cellulose, and Hydrogenated Lignin From Sawdust. Conrad Schuerch. *Forest Products Journal*, v. 8, May 1958, p. 150-153.

Most of the hemicellulose may be separated from hardwood sawdust by a brief alkaline extraction. The residual wood meal can be pulped in a soda cook with less alkali than is customarily used because most of the soluble carbohydrates have been removed. If pulping and catalytic hydrogenation are carried out simultaneously, the lignin is isolated in the form of distillable phenols and thermoplastic phenolic resins.

11546* Status of Tungsten Carbide in the Woodworking Industry. Rex. V. Reynolds. *Forest Products Journal*, v. 8, May 1958, p. 24A-26A.

Because of its hardness, rigidity, and wear resistance, tungsten carbide reduces maintenance costs in existing operations and makes possible machining operations that previously were not economical.

11547* Carbide Wood Cutting Tools. Kenneth W. Duff. *Forest Products Journal*, v. 8, May 1958, p. 33A-36A.

Advantages and limitations are discussed in relation to the various present applications and possible future uses. On the average, carbide tools last 20 to 50 times as long as steel, in some cases up to 500 times as long.

11548 Studies on the Chemistry of Aspenwood. II. Lignans From Aspen Spent Sulfite Liquor. Irwin A. Pearl, Donald L. Beyer, and Edgar E. Dickey. *Journal of Organic Chemistry*, v. 23, May 1958, p. 705-706.

Three isomeric lignans having the structure, tetrahydro-1,4-bis (4-hydroxy-3,5-dimethoxyphenyl)furo - 3,4-c - furan have been isolated from the spent sulfite liquor of aspenwood by means of chromatography and countercurrent distribution. Infrared absorption spectra indicate that two of these stereoisomers are forms of syringaresinol and lirioresinol, respectively.

11549 Leather and Shoes Blue Book of the Shoe and Leather Industry. 32nd Ed. 758 pp. 1958. Rumpf Publishing Co., Chicago. (TS945 L48)

11550 Nature of Some Decay-Retardant Extractive Components in Incense Cedar Heartwood (*Libocedrus decurrens* Torrey). Arthur B. Anderson and Eugene Zavarin. *Nature*, v. 181, May 3, 1958, p. 1275-1276.

Lists decay-retarding characteristics of six compounds from the steam volatile oil of the heartwood as determined by bioassay with four wood-destroying fungi. Compounds tested were: *n*-thujaplicin, carvacrol, *p*-methoxycarvacrol, hydrothymoquinone, thymoquinone, and *p*-methoxythynol.

11551* The Structure and Properties of Paper. VII. Study of the Mechanisms of Beating and Interfiber Bonding by Means of Esterification. H. G. Higgins, A. W. McKenzie, and K. J. Harrington. *Tappi*, v. 41, May 1958, p. 193-204.

The form of several relationships is interpreted in terms of fiber swelling and reduction in H bonding capacity between fibers.

11552* A Study of Improved Strength in Paper Made From Low-Substituted Carboxymethylcellulose Pulps. Krishan K. Talwar. *Tappi*, v. 41, May 1958, p. 207-215.

11553* The Relationship Between Pulp Quality and Alkali Concentration. C. B. Christjansen and G. W. Legg. *Tappi*, v. 41, May 1958, p. 216-223.

Using jack pine, Douglas-fir, and southern pine, kraft injection cooks were made to evaluate the result of controlled alkali concentration.

11554* The Role of Small Quantities of Neoprene in Paper. I. The Contribution of Neoprene to the Bonding Strength of Dry Paper and to Its Capacity to Absorb Energy Under Tension. II. Improvement of Wet Strength. Donald Graham. *Tappi*, v. 41, May 1958, p. 231-236.

11555* The Drainage Properties of Wood Fibers. II. The Determination and Influence of Hydration Upon Drainage. James E. Ayer. *Tappi*, v. 41, May 1958, p. 237-240.

A drying technique in which the sample was maintained in the conditioning atmosphere, while weight loss or drying rate was being determined.

11556* Bark Tolerance of Douglas-Fir Chips in Kraft Pulp Manufacture. R. M. Samuels and D. W. Glennie. *Tappi*, v. 41, May 1958, p. 250-255.

Trials designed to produce linerboard-type kraft, including up to 20% bark in the pulping raw material, showed no effect on pulp strength; yield and cleanliness, however, were reduced as bark content was increased.

11557* The Effect of Some Papermaking Materials Upon Certain Characteristics of Paper. George Vámos and Tibor Mérö. *Tappi*, v. 41, May 1958, p. 196A-206A.

Wheat, potato, rice, and some starches were investigated as to their effect on the mechanical properties.

11558* The Use of Glass Fibers in the Paper Industry. R. Peteri. *Tappi*, v. 41, May 1958, p. 228A-232A.

Three levels of glass fiber content are considered.

11559* Survey of Literature on the Dimensional Changes of Paper With Changes in Humidity. F. W. Lorey. *Tappi*, v. 41, May 1958, p. 233A-236A.

11560* (German.) A Contribution to the Morphology of Collagen Cross Structure, Elementary Fibrils and Arrangement in the Cellular Tissue. **Zur Morphologie von Kollagen: Querstruktur, Elementarfibrillen und Anordnung im Zellverband.** Th. Nemetschek. *Zeitschrift für Naturforschung*, v. 13b, no. 4, Apr. 1958, p. 225-234 + 8 plates.

See also: **10931** (paper industry prices); **10994** (required characteristics of paper for printing); **10995** (required characteristics of paper for printing); **11043** (pressure distribution in textile rolls).

WELDING AND JOINING

11561* Production Line Welding. John H. Bauer. *Automation*, v. 5, June 1958, p. 68.

11562* (Russian.) Weldability of Copper-Bearing Titanium Alloys. **K voprosu o svarivaemosti titanovykh splavov, soderzhashchikh med'.** S. M. Gurevich. *Avtomaticheskaia Svarka*, v. 11, no. 4, Apr. 1958, p. 32-36.

11563* (Russian.) Carbon-Dioxide Shielded-Arc Welding of "2 x 13" High-Chromium Steel. **Svarka Vysokokhromistoi stali 2 x 13 v srede uglekislogo gaza.** N. I. Kakhovskii. *Avtomaticheskaia Svarka*, v. 11, no. 4, Apr. 1958, p. 44-54.

11564* (Czech.) Joining of Aluminum Wires. **Spojování hliníkových vodičů.** B. Pařez, O. Novotný, L. Šimoník, F. Šubín, and B. Tille. *Elektrotechnik*, v. 13, no. 5, May 1958, p. 146-180.

Procedure and methods used in joining of Al and its alloys. Various types of welding and soldering; mechanical joining by connectors or by pressure.

11565 Recent Advances in Adhesives. John E. Rutzler, Jr., chairman. *Industrial and Engineering Chemistry*, v. 50, June 1958, p. 903-934.

A symposium of six papers covering organic metal adhesives, polyester glass adhesives, heat resistance of metal bonds, and significance of molecular structure.